

201-15843B

The Flavor and Fragrance High Production Volume Consortia

Revised Robust Summaries for Cinnamyl Derivatives

FFHPVC Aromatic Consortium Registration Number

The evaluation of the quality of the following data uses a systematic approach described by Klimisch [Klimisch *et al.*, 1996]. Based on criteria relating to international testing standards for categorizing data reliability, four reliability categories have been established. The following categories are:

- Reliability code 1. Reliable without restrictions
- Reliability code 2. Reliable with restrictions
- Reliability code 3. Not reliable
- Reliability code 4. Not assignable

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Summary of Key Hazard Data for Cinnamyl Derivatives

ENDPOINT	SUBSTANCE/SURROGATE ¹	VALUE/RANGE ²	REFERENCE
Vapor pressure	Cinnamaldehyde	0.0289 mm Hg (20°C)	CRC, 1973
Vapor pressure	<i>alpha</i> -Amylcinnamaldehyde	0.0012 mm Hg (20°C)	SRC
Vapor pressure	<i>alpha</i> -Hexylcinnamaldehyde	0.0002 mm Hg (20°C)	Vuilleumier, 1995
Vapor pressure	<i>p</i> -t-Butyl- <i>alpha</i> -methylhydrocinnamaldehyde	0.00358 mm Hg (20°C)	SCR
Partition Coefficient	Cinnamaldehyde	1.9	CRC, 1973
Partition Coefficient	<i>alpha</i> -Amylcinnamaldehyde	4.7 (OECD117)	Givaudan, 1994a
Partition Coefficient	<i>alpha</i> -Hexylcinnamaldehyde	5.3 (OECD117)	Givaudan, 1994d
Partition Coefficient	<i>p</i> -t-Butyl- <i>alpha</i> -methylhydrocinnamaldehyde	4.2 (OECD117)	Givaudan, 1994b
Environmental Fate			
Biodegradation³	Cinnamaldehyde	(+) (OECD 301B)	Haarmann & Reimer, 2001
Biodegradation	<i>alpha</i> -Amylcinnamaldehyde	(+) (OECD 301B)	Givaudan, 1992a, Quest, 1996
Biodegradation	<i>alpha</i> -Hexylcinnamaldehyde	(+) (OECD 301B)	Givaudan, 1992b, Quest, 1994

¹ Surrogate is a structurally related substance that may include a metabolic product or precursor of the named substance. Range of values may be reported for substance, surrogate or chemical category.

² Experimental value or values for a substance or group of substances in the chemical category

³ not biodegradable, (-); readily biodegradable, (+); ready and ultimately biodegradable, (++)

Biodegradation	<i>p-t</i> -Butyl- <i>alpha</i> -methylhydrocinnamaldehyde	(+) (OECD 301F)	Givaudan, 1994c, BBA, 1990
Biodegradation for Category	Cinnamyl Derivatives	Readily Biodegradable	
Ecotoxicity			
Fish	Cinnamaldehyde	96-hr LC50=4.3 mg/L NOEC=2.8 mg/L	Caspers, 1993
Fish	<i>alpha</i> -Amylcinnamaldehyde	96-hr LC50=3.14 mg/L	SRC
Fish	<i>alpha</i> -Hexylcinnamaldehyde	96-hr LC50=2.36 mg/L	SRC
Fish	<i>p-t</i> -Butyl- <i>alpha</i> -methylhydrocinnamaldehyde	96-hr LC50=3.19 mg/L	SRC
Acute Fish Toxicity Range	Cinnamyl Derivatives	LC50=1-5 mg/L	
Aquatic Invertebrates	Cinnamaldehyde	48-hr EC50=3.86 mg/L, NOEC=1.91 mg/L 48-hr EC50=11.5 mg/L	Ward, 2003a Barth &Winkler, 2001
Aquatic Invertebrates	<i>alpha</i> -Amylcinnamaldehyde	48-hr EC50=1.1 mg/L	Caspers, 1993
Aquatic Invertebrate Acute Toxicity	Cinnamyl Derivatives	48-hr EC50=1-5 mg/L	
Aquatic Plant	Cinnamaldehyde	72-hr EC50=4.56 mg/L, NOEC=2.00mg/L (no.cells/ml)	Ward, 2003b
Aquatic Plant	<i>alpha</i> -Amylcinnamaldehyde	72-hr EC50=1.18 mg/L, NOEC=0.154mg/L (no.cells/ml)	Ward, 2003c
Aquatic Plant Acute Toxicity	Cinnamyl Derivatives	72-hr EC50=1-5 mg/L	
Human Health			
Repeat Dose ⁴	Cinnamaldehyde	NOEL=125 mg/kg LOEL=500mg/kg (m&f,r,diet,90d) NOEL>200 mg/k (m&f,r,diet,12-wk) NOEL=625mg/kg LOEL=1250mg/kg (m&f,r,diet,90d) NOEL=>200mg/kg (m&f,r,diet,2 yrs)	Hagan, 1967 Trubek, 1958b NTP, 1995 NTP, 2003
Repeat Dose	<i>alpha</i> -Amylcinnamaldehyde	NOEL=34.9 mg/kg LOEL=320 mg/kg (m&f,,r,diet,14wk)	Carpanini, 1973
Repeat Dose	<i>alpha</i> -Hexylcinnamaldehyde	NOEL=125 mg/kg LOEL=250 mg/kg (m&f,r,dermal,90d)	Lough, 1980
Repeat Dose	<i>p-t</i> -Butyl- <i>alpha</i> -methylhydrocinnamaldehyde	NOEL=25 mg/kg LOEL=50 mg/kg (m,r,dermal,90d)	Givaudan, 1990c,1990d
Repeat Dose Toxicity	Cinnamyl Derivatives	NOEL=25-200 mg/kg	

⁴ Value is the NOAEL or NOEL (sex, species route, duration)

		bw/day	
Reproduction	<i>p-t</i>-Butyl-<i>alpha</i>-methylhydrocinnamaldehyde	NOEL=25 mg/kg LOAEL=50 mg/kg (m&f,r,gavage,13wk) NOEL=25 mg/kg (m&f,r,gavage,13 wk) NOEL>44.6 mg/kg (m&f,d,oral,13wk) NOEL=25 mg/kg (f,monkey,oral,90d) Pharmacokinetic model Peak plasma levels and AUC in rats at 25 and 100 mg/kg=100-1000 x plasma levels in humans after max..topical application	Givaudan, 1990c Givaudan, 1990d Givaudan, 1990e Givaudan, 1990g Hawkins,1994
Reproduction	Cinnamyl alcohol	NOEL>53.5mg/kg (m&f,r,gavage, 11d)	Zaitsev and Maganova, 1975
Reproduction	Cinnamic acid	NOEL>50 mg/kg (m&f,r,gavage, 11d)	Zaitsev and Maganova, 1975
Developmental	Cinnamaldehyde	NOEL>1200 mg/kg (f,m,gavage,d6-15)	Hardin, 1987
<i>In vitro</i> Genotoxicity⁵	Cinnamaldehyde	-AMS	Sekizawa and Shibamoto, 1982; Prival et al., 1982; Marnett, 1985; Lijinsky and Andrews, 1980; Kasamaki, 1982; Azizan and Blevins, 1995; Neudecker, 1983
	<i>alpha</i> -Amylcinnamaldehyde	- AMS	Wild, 1983; Fujita and Sasaki, 1987
	<i>alpha</i> -Hexylcinnamaldehyde	- AMS	Wild, 1983
<i>In vivo</i> Genotoxicity	Cinnamaldehyde	-SLR	Woodruff, 1985
	<i>alpha</i> -Amylcinnamaldehyde	-SLR	Wild, 1983
	<i>alpha</i> -Hexylcinnamaldehyde	-SLR	Wild, 1983

⁵ (-), no significant genotoxic potential; (=/-), equivocal evidence; (+), positive evidence of genotoxicity. AMS, Ames assay; MLA, Mouse Lymphoma assay; ABS, chromosomal aberration assay; UDS, Unscheduled DNA Synthesis; MN, Micronucleus test, SCE, Sister Chromatid Exchange assay, SLA, Sex-linked Lethal assay.

	Cinnamaldehyde	-UDS, MN,	Mirsalis, 1989; Hayashi, 1984, 1988; Mereto, 1994; NTP, 2003; Sakasi, 1990
	<i>alpha</i> -Amylcinnamaldehyde	-MN	Wild, 1983
	<i>alpha</i> -Hexylcinnamaldehyde	-MN	Wild, 1983
	<i>p</i> - <i>tert</i> -Butyl- <i>alpha</i> - methyldihydrocinnamaldehyde	-MN	Gudi and Krsmanovic, 2000

Robust Summaries

1 Chemical and Physical Properties

1.1 Melting Point

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Measured
Remarks for Test Conditions	No test conditions provided.
Melting Point	-7.5
Remarks for Results	The data are considered reliable.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Merck & Co., Inc. The Merck Index (1997) 12th Edition, Publishers: Merck Research Laboratories, Whitehouse Station, NJ.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Measured
Remarks for Test Conditions	No test conditions provided.
Melting Point	80 °C
Remarks for Results	The data are considered reliable.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Handbook of Chemistry and Physics (CRC) 54 th Edition (1973) Publishers: CRC Press, Cleveland, Ohio.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Mean or weighted
Melting Point	0.04 °C
Remarks for Data	Calculated

References

Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Mean or weighted
Melting Point	33.9 °C
Remarks for Data	Calculated
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Mean or weighted
Melting Point	44.4 °C
Remarks for Data	Calculated
References	Syracuse Research Corporation (SRC)

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Mean or weighted
Melting Point	46.3 °C
Remarks for Data	Calculated
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Melting Point	4 °C
References	Fenaroli's Handbook of Flavor Ingredients Volume II 3rd Edition. Edited by G. Burdock. CRC Press, 1994, Reston VA.

1.2 Boiling Point

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Boiling Point	246 °C
Remarks for Test Conditions	No test conditions provided
References	Handbook of Chemistry and Physics (CRC) 54 th Edition (1973) Publishers: CRC Press, Cleveland, Ohio.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Boiling Point	250 °C
Remarks for Test Conditions	No test conditions provided
References	Fragrance Materials Association (FMA)

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Boiling Point	284 °C
Remarks for Test Conditions	No test conditions provided
References	Fragrance Materials Association (FMA)

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Boiling Point	226.7 °C
Method/guideline	Stein and Brown Method
Remarks for Test Conditions	Calculated
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7

Boiling Point	304.8 °C
Method/guideline	Stein and Brown Method
Remarks for Test Conditions	Calculated
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Boiling Point	305 °C
Remarks for Test Conditions	No test conditions provided
References	Fragrance Materials Association (FMA)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Boiling Point	318.7 °C
Method/guideline	Stein and Brown Method
Remarks for Test Conditions	Calculated
References	Syracuse Research Corporation (SRC)

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methylidihydrocinnamaldehyde
CAS No.	80-54-6
Boiling Point	280 °C
Method/guideline	Stein and Brown Method
Remarks for Test Conditions	Calculated
References	Syracuse Research Corporation (SRC)

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methylhydrocinnamaldehyde
CAS No.	80-54-6
Boiling Point	258°C
References	Arctander's Perfume and Flavor Chemicals Vol. I Publisher: S. Arctander (1969) Montclair, NJ

1.3 Vapor Pressure

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Measured
GLP	NA
Vapor Pressure	0.0289mm Hg (0.00347 kPa)
Temperature	20 °C
References	Handbook of Chemistry and Physics (CRC) 54 th Edition (1973) Publishers: CRC Press, Cleveland, Ohio.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Calculated
GLP	NA
Vapor Pressure	0.02mm Hg (0.00267 kPa)
Temperature	20 °C
References	Fragrance Materials Association (FMA)

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Modified Antoine and Grain Method
GLP	NA
Vapor Pressure	0.09 mm Hg (0.012 kPa)
Temperature	20 °C
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Calculated

GLP	NA
Vapor Pressure	<0.001 mm Hg (<0.00013 kPa)
Temperature	20 °C
References	Fragrance Materials Association (FMA)

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Modified Grain Method
GLP	NA
Vapor Pressure	0.0012 mm Hg ((0.00016 kPa)
Temperature	20 °C
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
GLP	NA
Year	1995
Vapor Pressure	0.0002 mm Hg (0.000027 kPa)
Temperature	20 °C
References	Vuilleumier C., Flament, I., Sauvegrain, P. (1995) Headspace measurement of evaporation rates of perfumes applied onto the skin: Application to rose essential oils and their principal components. Perfumer and Flavorist 20(2), 1-9.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Calculated
GLP	NA
Vapor Pressure	<0.001 mm Hg (<0.00013 kPa)
Temperature	20 °C
References	Fragrance Materials Association (FMA)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Modified Grain Method
GLP	NA
Vapor Pressure	0.00048 mm Hg (0.000064 kPa)
Temperature	20 °C
References	Syracuse Research Corporation (SRC)

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Modified Grain Method
GLP	NA
Vapor Pressure	0.00358 mm Hg (0.00048 kPa)
Temperature	20 °C
References	Syracuse Research Corporation (SRC)

1.4 Octanol/Water Partition Coefficient

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
GLP	NG
Year	NG
Method/guideline	Measured
Partition coefficient	1.9
Remarks for Data Reliability	Comparable to guidelines/standards.
Data Quality Reliabilities	Reliability code 2. Reliable with restrictions.
References	Syracuse Research Corporation (SRC)-(Hansch et al, 1995)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	OECD Guideline No. 117
GLP	Yes
Year	1994
Log Pow	5.3
Temperature	24 °C
Remarks for Data Reliability	Guideline study. The log Kow compares well with the calculated value. Data are considered reliable.
Data Quality Reliabilities	Reliability 1. Reliable without restriction.
References	Givaudan-Roure (1994d) Partition coefficient n-octanol/water of alpha-hexylcinnamaldehyde. Unpublished report to RIFM.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
GLP	NG
Year	NG
Method/guideline	Calculated
Partition coefficient	1.82
Remarks for Data Reliability	Comparable to guidelines/standards.
Data Quality Reliabilities	Reliability code 2. Reliable with restrictions.
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
GLP	Yes
Year	1994
Method/guideline	OECD Guideline No. 117
Log Pow	4.7
Temperature	24 °C
Remarks for Data Reliability	Guideline study. The log Kow compares well with the calculated value. Data are considered reliable.

Data Quality Reliabilities	Reliability code 1. Reliable without restriction.
References	Givaudan-Roure (1994a) Partition coefficient n-octanol/water of alpha-amylcinnamaldehyde. Unpublished report to RIFM.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
GLP	NG
Year	NG
Method/guideline	Calculated
Log Pow	4.33
Remarks for Data Reliability	Comparable to guidelines/standards.
Data Quality Reliabilities	Reliability code 2. Reliable with restrictions.
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
GLP	NG
Year	NG
Method/guideline	Calculated
Log Pow	4.82
Remarks for Data Reliability	Comparable to guidelines/standards.
Data Quality Reliabilities	Reliability code 2. Reliable with restrictions.
References	Syracuse Research Corporation (SRC)

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
GLP	NG
Year	1996
Method/guideline	Measured
Log Pow	4.9

Remarks for Data Reliability	Comparable to guidelines/standards.
Data Quality Reliabilities	Reliability code 2. Reliable with restrictions.
References	Quest (1994) Private communication to FMA.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
GLP	NG
Year	NG
Method/guideline	Calculated
Log Pow	4.36
Remarks for Data Reliability	Comparable to guidelines/standards.
Data Quality Reliabilities	Reliability code 2. Reliable with restrictions.
References	Syracuse Research Corporation (SRC)

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
GLP	Yes
Year	1994
Method/guideline	OECD Guideline No. 117
Log Pow	4.2
Temperature	24 °C
Remarks for Data Reliability	Guideline study. The log Kow compares well with the calculated value. Data are considered reliable.
Data Quality Reliabilities	Reliability 1. Reliable without restriction.
References	Givaudan-Roure (1994b) Partition coefficient n-octanol/water of <i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamic aldehyde. Unpublished Report to RIFM.

1.5 Water Solubility

Substance Name	Cinnamaldehyde
CAS No.	104-55-2

Method/guideline	Measured
Value (mg/L) at temperature	1420 mg/L (20 °C)
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 2. Reliable with restrictions.
References	Syracuse Research Database

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Calculated at log Kow=1.90 (ESPKOW)
Value (mg/L) at temperature	2150 mg/L
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 2. Reliable with restrictions.
References	ESPOW

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Calculated at log Kow=4.33 (ESPKOW)
Value (mg/L) at temperature	8.5 mg/L
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 2. Reliable with restrictions.
References	ESPKOW

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Calculated at log Kow=4.82 (ESPKOW)
Value (mg/L) at temperature	2.75 mg/L
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 2. Reliable with restrictions.
References	ESPKOW

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methylidihydrocinnamaldehyde
CAS No.	80-54-6
Year	1995

Method/guideline	OECD 105
Value (mg/L) at temperature	33 mg/L at 20 °C
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 1. Reliable without restrictions.
References	Givaudan-Roure (1995) Water solubility of <i>p</i> -t-butyl- α -methylhydrocinnamic aldehyde. Unpublished Report to RIFM.

Substance Name	<i>p</i> -t-Butyl- α -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Year	1994
Method/guideline	NG
Value (mg/L) at temperature	<100 mg/L at 20 °C
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 2. Reliable with restrictions.
References	Givaudan-Roure (1995) Water solubility of <i>p</i> -t-butyl- α -methylhydrocinnamic aldehyde. Unpublished Report to RIFM.

Substance Name	<i>p</i> -t-Butyl- α -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Year	1990
Method/guideline	NG
Value (mg/L) at temperature	0.02% w/v (200 mg/L)
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 2. Reliable with restrictions.
References	Bush Boake Allen (BBA) (1990). Biodegradability of <i>p</i> -t-butyl- α -methylhydrocinnamic aldehyde and methyl- α -ionone. Unpublished report to RIFM.

Substance Name	<i>p</i> -t-Butyl- α -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Calculated at log Kow= 4.36 (ESKOW)
Value (mg/L) at temperature	7.8 mg/L
Remarks for Data Reliability	Comparable to guidelines/standards. Reliability code 2. Reliable with restrictions.
References	ESPKOW

2 Environmental Fate and Pathways

2.1 Photodegradation

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Calculation
Test Type	AOPWIN
Half-life t_{1/2}	3.17
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	AOPWIN

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Calculation
Test Type	AOPWIN
Half-life t_{1/2}	2.40 hrs
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	AOPWIN

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Calculation
Test Type	AOPWIN
Half-life t_{1/2}	2.33 hrs
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	AOPWIN

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Calculation
Test Type	AOPWIN
Halflife t1/2	3.88 hrs
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	AOPWIN

2.2 Biodegradation

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Biodegradability was determined by sealed vessel test based on OECD Guideline 301 B.
Test Type	OECD 301 B CO2 evolution
GLP	Yes
Year	1996
Contact Time (units)	28 days
Innoculum	Secondary effluent from an unacclimatized activate
Degradation % after time	89% at 7 days, 94% at 14 days and 100% at 21, 27, and 28 days
Time required for 10% degradation	1 day
10 day window criteria	Yes
Total degradation	100%
Conclusion Remarks	Readily biodegradable
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 301B guidelines.
References	Haarmann and Reimer (2001) Ready Biodegradability of Cinnamic Aldehyde according to OECD Guideline No. 301B Private Communication to RIFM.
Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamic aldehyde, 91-98% pure, clear, almost colorless liquid, fresh, light, green

	floral, reminiscent of lily; strongly diffusive
CAS No.	80-54-6
Method/guideline	OECD Guideline 301F
Test Type	Respirometric Method, MITI Test I
GLP	Yes
Year	1994
Contact Time (units)	28 days
Innoculum	Acitivated sludge fro a local sewage plant
Remarks for Test Conditions	Samples were incubated with acitivated sludge for 28 days.
Degradation % after time	Reference material was 100 mg/L aniline. BOD was measured 68% at 28 days
Results	At 50 mg/L, 84% biodegradation was recorded at 28 days and 78% in 10 day window (days 8 to 18). At 100 mg/L, 68% biodegradation was recorded at 28 days and 57% in 10 day window (days 8 to 18)
Time required for 10% degradation	NA
10 day window criteria	Yes
Total degradation	NA
Conclusion Remarks	The shape of the biodegradation curve indicated the occurrence of an adaptation period for biodegradation.
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 301F guidelines.
References	Givandan-Roure (1994c) Ready biodegradability of <i>p</i> -t-butyl- α -methylhydrocinnamic aldehyde Unpublished report to RIFM.

Substance Name	<i>p</i> -t-Butyl- α -methyldihydrocinnamic aldehyde, 91-98% pure, clear, almost colorless liquid, fresh, light, green floral, reminiscent of lily; strongly diffusive
CAS No.	80-54-6
Method/guideline	OECD Guideline 111 & Directive 92/69/EEC, Method C.7
Test Type	Abiotic degradation
GLP	NG
Year	1995
Contact Time (units)	16 days
Innoculum	None; Aqueous solution (10 mg/L) in air

Remarks for Test Conditions	Samples were agitated in air, regularly removed and analyzed for the test substances by HPLC.
Degradation % after time	>50% at 16 days
Results	Oxidation reactions follow pseudo first order kinetics.
Time required for 10% degradation	NA
10 day window criteria	NA
Total degradation	NA
Conclusion Remarks	The authors concluded that the test substance has an approximately lifetime of two weeks in the environment. The corresponding acid is the major oxidation product identified.
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 111 guidelines.
References	Givandan-Roure (1995b) Stability of <i>p</i> -t-butyl-alpha-methylhydrocinnamic aldehyde in aqueous solution in the presence of air. Unpublished report to RIFM.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamic aldehyde, 91-98% pure, clear, almost colorless liquid, fresh, light, green floral, reminiscent of lily; strongly diffusive
CAS No.	80-54-6
Method/guideline	Method F
Test Type	DOC - Method F from Blue book series, 1981
GLP	NG
Year	1990
Contact Time (units)	28 days
Innoculum	Activated sludge from local STP
Remarks for Test Conditions	50.04 mg DOC/L at 20 C for 28 days
Degradation % after time	96% at 31 days
Results	92 % biodegradation after 28 days. 96% after day 31.
Time required for 10% degradation	<1 day
10 day window criteria	Yes
Total degradation	Yes
Conclusion Remarks	Readily biodegradable
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.

Remarks for Data Reliability	The study was conducted in accordance with OECD 301F guidelines.
References	Bush Boake Allen (BBA) (1990). Biodegradability of <i>p</i> -t-butyl-alpha-methylhydrocinnamic aldehyde and methyl-alpha-ionone. Unpublished report to RIFM.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Biodegradability was determined by sealed vessel test based on OECD Guideline 301 B.
Test Type	OECD 301 B CO2 evolution
GLP	Yes
Year	1996
Contact Time (units)	28 days
Innoculum	Secondary effluent from an unacclimatized activate
Degradation % after time	65% at 28 days
Time required for 10% degradation	9 days
10 day window criteria	Yes
Total degradation	No
Conclusion Remarks	Readily biodegradable
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 301B guidelines.
References	Givaudan-Roure (1989) Ready Biodegradability of Amyl Cinnamic Aldehyde according to OECD Guideline No. 301B Private Communication to FMA.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Ready biodegradability of amyl acinnamic aldehyde was determined according to OECD Guideline No. 301F.
Test Type	OECD No. 301F Respirometric method/ SAPROMAT
GLP	Yes
Year	1992
Contact Time (units)	28 days
Innoculum	Activated sludge

Remarks for Test Conditions	Bottle 1 & 2: Basal culture medium + activated sludge 30 mg/l + test chemical (100 mg/l); Bottle 3: Basal culture medium + activated sludge 30mg/l+aniline (100mg/l); Bottle 4: Basal culture medium + activated sludge 30 mg/l.
Degradation % after time	90% in 28days
Results	90% of the test chemical was biodegraded in 28 day as compared to only 61% of reference material (aniline) was biodegraded in 28 days.
Total degradation	Yes
Conclusion Remarks	Readily biodegradable
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 301F guidelines.
References	Givaudan Roure (1992a). Ready Biodegradability of Amyl Cinnamic Aldehyde according to OECD Guideline No. 301F. Unpublished report to RIFM.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde: Pale yellow oily liquid with sweet slightly floral odor.
CAS No.	101-86-0
Method/guideline	Sealed vessel test: based on OECD Guideline 301B
Test Type	OECD 301B CO2 evolution
GLP	Yes
Year	1994
Contact Time (units)	28 days
Innoculum	Secondary effluent from unacclimatized activated sludge plant
Remarks for Test Conditions	Test concentration: 11.9 mg/l organic carbon. Test temp: 20-24 °C
Degradation % after time	76.5% at 28 days
Results	76.5% biodegradable (95% CI-67.0-85.9) in 28 days.
Time required for 10% degradation	<11 days
10 day window criteria	No
Total degradation	No
Conclusion Remarks	The test substance achieved the 60% pass level by day 28 but failed the 10 day window criterium and therefore can be classified as ultimately biodegradable according to this test protocol.
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 301B guidelines.

References

Quest (1994) Report on Hexyl Cinnamic Aldehyde Biodegradation.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Ready Biodegradability of the test material was determined according to OECD Guideline No. 301F
Test Type	OECD No. 301F, Respirometric method
GLP	Yes
Year	1992
Contact Time (units)	28 days
Innoculum	Activated sludge
Remarks for Test Conditions	Bottle 1 & 2: Basal culture medium + activated sludge 30 mg/l + test chemical (~100 mg/l). Bottle 3: Basal culture medium + activated sludge 30 mg/l + aniline (~100 mg/l); Bottle 4: Basal culture medium + activated sludge 30 mg/l.
Degradation % after time	97% in 28 days
Results	97% of the test material was biodegraded in 28 days as compare to 61% of aniline in the same period.
Total degradation	Yes
Conclusion Remarks	Readily biodegradable
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 301F guidelines.
References	Givaudan Roure. (1992b). Ready Biodegradability of Hexyl Cinnamic Aldehyde according to OECD Guideline No. 301F. Unpublished report to RIFM.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde 94% pure - 44% cis and 50% trans
CAS No.	5392-40-5
Test Type	OECD 301B CO2 evolution
GLP	No
Year	1994
Contact Time (units)	28 days
Innoculum	Secondary effluent from sludge from local STP
Remarks for Test Conditions	10 mg/l organic carbon at 20 °C for 28 days

Degradation % after time	92.1% at 28 days
Results	92.1% biodegradation in 28 days
Time required for 10% degradation	<4 days
10 day window criteria	Yes
Total degradation	No
Conclusion Remarks	Readily biodegradable
Data Qualities Reliabilities	Reliability code 1. Reliable without restriction.
Remarks for Data Reliability	The study was conducted in accordance with OECD 301B guidelines.
References	Quest (1994) Private communication to FMA.

2.3 Fugacity

Substance	Cinnamaldehyde
CAS	104-55-2
Model Conditions	25 C, 1000 lbs.
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used (title, version, date)	EQC Fugacity Level III
Input parameters	MW, VP(0.0289 mm Hg), log Kow (1.9), water solubility (1420 mg/L), MP, -7.5 °C, BP, 246.°C
Year	2000
Media	Air-Water-Soil-Sediment Partition Coefficients
Model data and results	Compartment half-lives, hours: Air=7.77; Water=900; Soil=900; Sediment=3600
Estimated Distribution and Media Concentration	Air=0.597% Water=25.6% Soil=68.4% Sediment=5.47%
Conclusion remarks	Substance is predicted to persist in the environment for 632 hours.
Reliabilities	Reliability code 4. Not assignable.
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or

metabolism.

References	Mackay D., A.DiGuardo, S.Paterson and C.E.Cowan (1996b) Evaluating the fate of a variety of types of chemicals using the EQC model. Environmental Toxicology and Chemistry, 15(9), 1627-1637.
Substance	<i>alpha</i> -Amylcinnamaldehyde
CAS	122-40-7
Model Conditions	25 C, 1000 lbs.
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used (title, version, date)	EQC Fugacity Level III
Input parameters	MW, VP(0.0012 mm Hg), log Kow (4.7), water solubility (8.5 mg/L), MP, 80 °C, BP, 284.°C
Year	2000
Media	Air-Water-Soil-Sediment Partition Coefficients
Model data and results	Compartment half-lives, hours: Air=3.47; Water=360;Soil=360;Sediment=1400
Estimated Distribution and Media Concentration	Air=0.575% Water=32.6% Soil=57.3% Sediment=9.53%
Conclusion remarks	Substance is predicted to persist in the environment for 302 hours.
Reliabilities	Reliability code 4. Not assignable.
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Mackay D., A.DiGuardo, S.Paterson and C.E.Cowan (1996b) Evaluating the fate of a variety of types of chemicals using the EQC model. Environmental Toxicology and Chemistry, 15(9), 1627-1637.
Substance	alpha-Hexylcinnamaldehyde
CAS	101-86-0
Model Conditions	25 C, 1000 lbs.
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay

Model Used (title, version, date)	EQC Fugacity Level III
Input parameters	MW, VP(0.0002 mm Hg), log Kow (5.3), water solubility (2.75 mg/L), MP, 44 °C, BP, 305.°C
Year	2000
Media	Air-Water-Soil-Sediment Partition Coefficients
Model data and results	Compartment half-lives, hours: Air=3.41; Water=360;Soil=360;Sediment=1400
Estimated Distribution and Media Concentration	Air=0.449% Water=25.4% Soil=47.7% Sediment=26.5%
Conclusion remarks	Substance is predicted to persist in the environment for 364 hours.
Reliabilities	Reliability code 4. Not assignable.
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Mackay D., A.DiGuardo, S.Paterson and C.E.Cowan (1996b) Evaluating the fate of a variety of types of chemicals using the EQC model. Environmental Toxicology and Chemistry, 15(9), 1627-1637.
Substance	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS	80-54-6
Model Conditions	25 C, 1000 lbs.
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used (title, version, date)	EQC Fugacity Level III
Input parameters	MW, VP(0.00358 mm Hg), log Kow (4.2), water solubility (33 mg/L), MP, 46 °C, BP, 258.°C
Year	2000
Media	Air-Water-Soil-Sediment Partition Coefficients
Model data and results	Compartment half-lives, hours: Air=7.77; Water=900;Soil=900;Sediment=3600
Estimated Distribution and Media Concentration	Air=0.597% Water=25.6% Soil=68.4% Sediment=5.47%
Conclusion remarks	Substance is predicted to persist in the environment for 632 hours.
Reliabilities	Reliability code 4. Not assignable.

Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Mackay D., A.DiGuardo, S.Paterson and C.E.Cowan (1996b) Evaluating the fate of a variety of types of chemicals using the EQC model. Environmental Toxicology and Chemistry, 15(9), 1627-1637.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Air-Water Partition Coefficient
Absorption Coefficient	0.0099
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Soil-Water Partition Coefficient

Absorption Coefficient	986
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Sediment-Water Partition Coefficient
Absorption Coefficient	1970
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Suspended Sediment-Water Partition Coefficient

Absorption Coefficient	6160
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Fish-Water Partition Coefficient
Absorption Coefficient	2510
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Aerosol-Air Partition Coefficient

Absorption Coefficient	9570000
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Air
Estimated Distribution and Media Concentration	9.7%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Water

Estimated Distribution and Media Concentration Data Qualities Reliabilities	1.94% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Soil
Estimated Distribution and Media Concentration Data Qualities Reliabilities	86.4% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Sediment

Estimated Distribution and Media Concentration Data Qualities Reliabilities	1.92% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Suspended Sediment
Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.06% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Fish

Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.0049% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, VP, estimated MP
Media	Aerosol
Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.0018% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Air-Water Partition Coefficient

Absorption Coefficient	0.022
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Soil-Water Partition Coefficient
Absorption Coefficient	3230
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Sediment-Water Partition Coefficient

Absorption Coefficient	7850
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Suspended Sediment-Water Partition Coefficient
Absorption Coefficient	24500
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Fish-Water Partition Coefficient

Absorption Coefficient	9980
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Aerosol-Air Partition Coefficient
Absorption Coefficient	14100000
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Air

Estimated Distribution and Media Concentration Data Qualities Reliabilities	5.7% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Water
Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.52% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Soil

Estimated Distribution and Media Concentration Data Qualities Reliabilities	91.7% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Sediment
Estimated Distribution and Media Concentration Data Qualities Reliabilities	2.0% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Suspended Sediment

Estimated Distribution and Media Concentration	0.064%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Fish
Estimated Distribution and Media Concentration	0.0052%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Aerosol

Estimated Distribution and Media Concentration	0.0016%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Air-Water Partition Coefficient
Absorption Coefficient	0.0031
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Soil-Water Partition Coefficient

Absorption Coefficient	1.30
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Sediment-Water Partition Coefficient
Absorption Coefficient	2.60
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Suspended Sediment-Water Partition Coefficient

Absorption Coefficient	8.12
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Fish-Water Partition Coefficient
Absorption Coefficient	3.30
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Aerosol-Air Partition Coefficient

Absorption Coefficient	483000
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Air
Estimated Distribution and Media Concentration	12.7%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Water

Estimated Distribution and Media Concentration Data Qualities Reliabilities	82.4% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Soil
Estimated Distribution and Media Concentration Data Qualities Reliabilities	4.82% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Sediment

Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.11% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Suspended Sediment
Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.0034% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Fish

Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.00027% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Aerosol
Estimated Distribution and Media Concentration Data Qualities Reliabilities	0.00012% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Air-Water Partition Coefficient

Absorption Coefficient	0.001
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Soil-Water Partition Coefficient
Absorption Coefficient	312
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Sediment-Water Partition Coefficient

Absorption Coefficient	624
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Suspended Sediment-Water Partition Coefficient
Absorption Coefficient	1950
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Fish-Water Partition Coefficient

Absorption Coefficient	792
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Aerosol-Air Partition Coefficient
Absorption Coefficient	15000000
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Air

Estimated Distribution and Media Concentration Data Qualities Reliabilities	3.2% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Water
Estimated Distribution and Media Concentration Data Qualities Reliabilities	6.3% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Soil

Estimated Distribution and Media Concentration Data Qualities Reliabilities	88.5% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Sediment
Estimated Distribution and Media Concentration Data Qualities Reliabilities	2.0% Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Suspended Sediment

Estimated Distribution and Media Concentration	0.061%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Fish
Estimated Distribution and Media Concentration	0.0050%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

Substance Name	<i>p</i> -t-butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Model Conditions	25 °C, 100,000 lbs
Test Type	Environmental Equilibrium Partitioning Model
Method	Mackay
Model Used	EQC V 2.11 Level 1
Input Parameters	MW, log Kow, water solubility, MP, estimated VP
Media	Aerosol

Estimated Distribution and Media Concentration	0.0010%
Data Qualities Reliabilities	Reliable with restriction
Remarks for Data Reliability	The data are obtained by a recognized fugacity calculation method. Data are considered reliable with restriction because this method does not allow for biodegradation or metabolism.
References	Level 1 Fugacity-based Environmental Equilibrium Partitioning Model Version 2.11. Based on Mackay, Donald (1991) Multimedia environmental models: The fugacity approach. Lewis Publications, CRC Press, Boca Raton, FL

3 Ecotoxicity

3.1 Acute Toxicity to Fish

Substance Name	Cinnamaldehyde
CAS Numerical	106-24-1
Remarks for Substance	Assay: >99%
Method/guideline	96-Hour semi-static toxicity test
GLP	Yes (Council Directive 92/69/EEC C.1 (1992)
Year	1993
Test Type	Experimental
Species/Strain/Supplier	Zebra fish/ <i>Brachydanio rerio</i> /Hamilton Buchanan/West Aquarium
Remarks for Test Conditions	Zebra fish (6-month old, length, 2.5-3.5 cm) were exposed to a series of 5 test concentrations of 0, 2.8, 3.9, 5.5, and 7.8 mg/L of cinnamaldehyde for 96 hours in a semi-static test. Ultra turrax was used as a solubilizer. Solutions were renewed every 24 hours. Fish were maintained on a schedule of 12 hours of light and 12 hours of darkness. Fish were observed twice daily for mortality and symptoms. GC analytical measurement of cinnamaldehyde concentrations in control solutions, <1 mg/L.
Conclusion Remarks	The acute 96-hour LC50 for cinnamaldehyde in zebra fish is 3.1 mg/L
Remarks for Results	Measured concentrations at 0 and 24 hours were: <0.25 mg/L for controls 2.63 and 2.68 mg/L at 0 hours and 0.87 and 1.94 mg/L at 24 hours for nominal concentration of 2.8 mg/L 3.75 and 3.69 mg/L at 0 hours and 2.12 and 2.62 mg/L at 24 hours for nominal concentration of 3.9 mg/L 5.42 and 5.23 mg/L at 0 hours and 3.67 and 4.18 mg/L at 24 hours for nominal concentration of 5.5 mg/L 7.43 and 7.09 mg/L at 0 hours and 5.54 and 6.72 mg/L at 24 hours for nominal concentration of 7.8 mg/L

Temperature, oxygen, oxygen saturation and pH measured at 0 and 24 hours were:

20.8-22.6 C, 8.3-9.1 mg/L, 99.9-110%, and 7.4-8.2 for controls;
20.9-22.7 C, 8.2-9.5 mg/L, 95.6-109.2%, and 7.5-8.2 at 2.8 mg/L.

21.1-22.7 C, 8.4-9.6 mg/L, 97.9-113%, and 7.5-8.2 at 3.9 mg/L

21.2-22.7 C, 8.6-9.6 mg/L, 99.9-111.5%, and 7.7-8.2 at 5.5 mg/L.

21.1-22.8 C, 8.6-9.5 mg/L, 99.9-113%, and 7.6-8.2 at 7.8 mg/L.

The cumulative number of deaths at each 24- hour intervals and the corresponding concentrations in mg/L at t=0, 24,48, 72, & 96 hours are:

control and 2.8 mg/L, 0/10 at all times;

at 3.9 mg/L, 0/10 at 0, 24, and 48 hours, 2/10 at 96 hours;

at 5.5 mg/L, 0/10 at 0, 24, and 48 hours, 9/10 at 72 hours and 10/10 at 96 hours

at 7.8 mg/L, 1/10 at 24 hours, and 10/10 at 48 hours

Analytical monitoring	GC
Unit	mg/L
Exposure period (unit)	96 hours
Nominal concentrations as mg/L	0, 2.8, 3.9, 5.5, and 7.8 mg/L
Measured concentrations as mg/L	
Endpoint value	96-hour LC0=2.8, 96-hour LC50=4.3 (plot of log conc vs % mortality), and 96-hour LC100=5.5 mg/L
Data Qualities Reliabilities	Reliability code 2. Reliable with restriction.
Remarks for Data Reliability	Code 2. Acceptable, well-documented publication/study report which meets basic scientific principles.
References	Caspers (1993) Acute fish toxicity of cinnamic aldehyde. Study No. 341 A/92 F. Private Communication to RIFM. Unpublished report.

Substance Name	Cinnamic aldehyde
CAS No.	104-55-2
Method/guideline	ECOSAR
Test Type	Calculated based on log Kow
Species/Strain/Supplier	Fish
Exposure period	96 hr
Conclusion Remarks	LC50 = 11.9 mg/l

Remarks for Data Reliability

The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	ECOSAR
Test Type	Calculated based on measured Kow
Species/Strain/Supplier	Fish
Exposure period	96 hr
Conclusion Remarks	LC50 = 3.14 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method but are not consistent with chemical structure. Data are considered overly conservative.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	ECOSAR
Test Type	Calculated based on measured Kow
Species/Strain/Supplier	Fish
Exposure period	96 hr
Conclusion Remarks	LC50 = 2.36 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method but are not consistent with chemical structure. Data are considered overly conservative.

Substance Name	<i>p</i> -tert-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	ECOSAR
Test Type	Calculated based on measured Kow
Species/Strain/Supplier	Fish
Exposure period	96 hr
Conclusion Remarks	LC50 = 3.19 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation

method but are not consistent with chemical structure. Data are considered overly conservative.

3.2 Acute Toxicity to Aquatic Invertebrates

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Remarks for Substance	Assay: 99%
Method/guideline	Acute toxicity for Daphnia, Directive 67/548/EWG (1992)
Test Type	Experimental (48- hr static test)
GLP	Yes
Year	1992
Analytical procedures	GLC
Species/Strain	Daphnia magna/Strauss-pathogen free.
Test details	48 hrs.
Remarks for Test Conditions	Parthenogenetic female daphnids (6-24 hours old) produced from a laboratory culture of adults. 40 daphnid were randomly selected for each replicate test. Tests were performed at 5 nominal concentrations. Mortality, immobility, and sub-lethal effects were determined visually at 0, 24, and 48 hours. Test temperature was maintained at 20.3-20.5 C
Nominal concentrations as mg/L	0, 0.2, 0.4, 0.7, 1.4, 2.8, and 5.5 mg/L
Measured concentrations as mg/L	Control: 0 hrs, 0.02; 48 hrs <0.02 mg/L 0.2 mg/L: 0 hrs, 0.022; 48 hrs 0.05 mg/L 5.50 mg/L: 0 hrs, 5.12; 48 hrs, 2.94 mg/L
Unit	mg/L
EC50, EL50, LC0, at 24,48 hours	48-hr EC0=0.4 mg/Land 48 hr EC50=1.1 mg/L; EC100=2.8 mg/L
Biological observations	The number of daphnids exhibiting immobilization at 48 hours for duplicate runs at each mean measured concentration was:0 mg/L, 0/40 & 0/40; 0.20 mg/L, 0/40 & 0/40; 0.4 mg/L, 0/40 0/40; 0.7, 4/40 & 5/40; 1.4 mg/L, 25/40 & 31/40; 2.8 mg/L, 40/40 & 32/40;
Control response satisfactory?	yes
Appropriate statistical evaluations?	None
Remarks fields for results	The respective ranges for pH, dissolved oxygen, and temperature were: 7.8-7.9, 8.1-8.5 mg/L, and 20.3-20.5C, respectively.
Conclusion remarks	The acute 48-hour EC50 for amylcinnamaldehyde in Daphnia magna under static conditions was 1.1 mg/L, respectively. The NOEC in Daphnid magna was 0.4 mg/L

Reliabilities	Reliability Code No. 1. Reliable without restriction.
Remarks for Data Reliability	The data are obtained by a recognized guideline method and are consistent with chemical structure.
References	Caspers (1992) Acute toxicity of amylcinnamaldehyde and the Daphnid, <i>Daphnia magna</i> . Study No. HR91/613101. Private communication to RIFM. Unpublished Report.
Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Remarks for Substance	Assay: 65-75%
Method/guideline	OECD 202-I Guideline (1984)
Test Type	Experimental (48- hr static test)
GLP	Yes
Year	1999
Analytical procedures	GLC
Species/Strain	<i>Daphnia magna</i> /Straus
Test details	<p><i>Daphnia</i> (2-24 hrs. old) were decanted into 25 ml glass beakers, each containing 10 ml of test solution with the test substance in various concentrations. Test solutions were prepared by emulsification of the test substance in water with acetone. There were 5 <i>Daphnia</i> per beaker and 5 beakers per each concentration. Test conditions consisted of a 16 hr./8 hr. light/dark cycle, a light intensity of 200 lx, oxygen concentration of 8.4-8.6 and temperature of 20.2-20.5 degrees Celsius. Test solutions were exposed to 16 hours of light and 8 hours of darkness. The <i>Daphnia</i> are examined for mobility after 24 and 48 hours. <i>Daphnia</i> which showed no reaction after 15 seconds were considered immobile. The pH, oxygen content and temperature were measured at the beginning and end of the test. Probit analysis was performed to determine the EC50.</p>
Remarks for Test Conditions	None
Nominal concentrations as mg/L	0, 3.8, 7.5, 15.0, 30.0, and 60 mg/L
Measured concentrations as mg/L	
Unit	mg/L
EC50, EL50, LC0, at 24,48 hours	48 hr EC50=11.5 mg/L; EC100=30.0 mg/L
Biological observations	The number of daphnids exhibiting immobilization at 48 hours for quadruplicate runs at each mean measured concentration was:0, 3.8, 7.5 mg/L, 0/5 for all tests; 15 mg/L, 4/5 (3 runs) & 5/5 (1 test); 30 and 60 mg/L 5/5 at in all tests.

Control response satisfactory?	yes
Appropriate statistical evaluations?	Probit Analysis
Remarks fields for results	The respective ranges for pH, dissolved oxygen, and temperature were: 7.75-8.19, 8.2-8.4 mg/L, and 20.2-20.5C, respectively.
Conclusion remarks	The acute 48-hour EC50 for cinnamaldehyde (65-75%) in <i>Daphnia magna</i> under static conditions was 11.5 mg/L.
Reliabilities	Reliability Code No. 1. Reliable without restriction.
Remarks for Data Reliability	The data are obtained by a recognized guideline method and are consistent with chemical structure.
References	Barth M. and Winkler J. (2001) Acute toxicity of cinnamon bark oil in <i>Daphnia magna</i> . OECD Guideline 202-1. Study No. 001048503. Private communication to RIFM. Unpublished Report.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Remarks for Substance	Assay: 100%
Method/guideline	OECD 202
Test Type	Experimental (48- hr semi-static test with 24 hour renewal)
GLP	Yes
Year	2003
Analytical procedures	HPLC/UV detector
Species/Strain	<i>Daphnia magna</i> /Aquatic Biosystems, Inc.
Test details	48 hrs.
Remarks for Test Conditions	Juvenile daphnids (<24 hours old) produced from an in-house culture of adults were maintained at the contract laboratory under test conditions for 45 days. During the 48 hours prior to testing, the daphnid culture was maintained in 100% dilution water under static, renewal conditions for 48 hours. There was no mortality during the 48 hours prior to test and the test organisms appeared free of disease, injuries, or abnormalities. The daphnid culture produced young before day 12 and a subsample of adults produced on average, more than 3 young per day during the 7 days prior to the beginning of the test. Ten daphnid were randomly selected for each replicate test. Tests were performed at 5 nominal concentrations. During the 48-hr test, daphnid were exposed to 16 hours of light and 8 hours of darkness. Mortality, immobility, and sub-lethal effects were

determined visually at 0, 24, and 48 hours. Test solutions were renewed every 24 hours. Test temperature was maintained at 19.5-20.7 °C

Nominal concentrations as mg/L	0, 2.0, 3.3, 5.5, 9.0, 15, and 25 mg/L
Measured concentrations as mg/L	0.00452 (control), 1.91, 3.34, 5.30, 9.57, 13.9, and 25.5 mg/L (mean concentration)
Unit	mg/L
EC50, EL50, LC0, at 24,48 hours	48-hr EC50=3.86 mg/L and 48 hr LC50=4.22 mg/L; NOEC 1.91 mg/L
Biological observations	The number of surviving daphnids at 48 hours for duplicate runs at each mean measured concentration was: 0 mg/L, 10/10 & 10/10; 1.91 mg/L, 9/10 & 10/10; 3.34 mg/L, 9/10 & 8/10; 5.30 mg/L, 2/10 & 1/10; 9.57 mg/L, 1/10 & 0/10; 13.9 and 25.5 mg/L 0/10 & 0/10.
Control response satisfactory?	yes
Appropriate statistical evaluations?	Probit method (Stephan, 1978)
Remarks fields for results	The measured concentrations after 24 and 48 hours were 93-106% of the nominal concentrations, with the concentration being held steady throughout the test period. The respective ranges for conductivity, pH, dissolved oxygen, and temperature were: 590-600 umhos/cm, 6.8-7.1, 8.2-9.1 mg/L, and 19.5-20.7°C, respectively.
Conclusion remarks	The acute 48-hour EC50 and LC50 for cinnamaldehyde in Daphnia magna under semi-static conditions were 3.86 and 4.22 mg/L, respectively. The NOEC for cinnamaldehyde in Daphnia magna is 1.91 mg/L
Reliabilities	Reliability Code No. 1. Reliable without restriction.
Remarks for Data Reliability	The data are obtained by a recognized guideline method and are consistent with chemical structure.
References	Ward T. (2003a) Acute toxicity test with cinnamaldehyde and the Daphnid, Daphnia magna. Study No. 2463-FF. Private communication to FFHPVC. Unpublished Report.
Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	ECOSAR
Test Type	Calculated based on log Kow
Species/Strain	Daphnia magna
Test Details	48 hrs
Remarks for Results	LC50 = 8.1 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	ECOSAR

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	ECOSAR
Test Type	Calculated based on measured Kow
Species/Strain	Daphnia magna
Test Details	48 hrs
Remarks for Results	LC50 = 0.42 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	ECOSAR

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	ECOSAR
Test Type	Calculated based on measured Kow
Species/Strain	Daphnia magna
Test Details	48 hrs
Remarks for Results	LC50 = 0.22 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	ECOSAR

Substance Name	<i>p</i> -tert-Butyl- <i>alpha</i> -methyldihydrocinnamic aldehyde
CAS No.	80-54-6
Method/guideline	ECOSAR
Test Type	Calculated based on measured Kow
Species/Strain	Daphnia magna
Test Details	48 hrs
Remarks for Results	LC50 = 0.40 mg/l

Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	ECOSAR

3.3 Acute Toxicity to Aquatic Plants

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Remarks for Substance	Assay: 100%
Method/guideline	OECD 201 Guideline
Test Type	Experimental
GLP	Yes
Year	2003
Species/Strain/Supplier	Green algae/Selenastrum capricornutum/UTEX 1648
Exposure period (duration)	72 hrs
Analytical monitoring	HPLC/UV detector
Remarks for Test Conditions	Green Algae/Selenastrum capricornutum/U. of Texas was maintained at test conditions for 14 days prior to the test. The culture was growing in at least 2 subcultures prior to the initiation of the test. In a range finding test, the number of cells/mL was >100 % of controls at 0.10 mg/L, 80% at 1.0 mg/L, and <1% at 100 mg/L after three days. In the definitive test, algae was treated with nominal concentrations of 0, 0.50, 1.0, 2.0, 4.0 and 8.0 mg/L for 72 hours. pH was adjusted to 7.5 and solutions were exposed for 24 hours of light of intensity, 400-410 foot candles. The number of algal cells/mL as well as relative size, cell shapes, color, adherence and aggregation of cells was determined. At 24, 48, and 72 hours 3 treatment and 6 control vessels were sacrificed to determine the number of algal cells/mL. Concentrations were determined by HPLC.
Nominal concentrations as mg/L	0, 0.5, 1.0, 2.0, 4.0, and 8.0 mg/L
Measured concentrations as mg/L	Initial mean measured concentrations 0.523, 1.04, 2.00, 3.80, and 7.03 mg/L; Final measured were 88-105% of nominal concentrations
Unit	mg/L
NOEC, LOEC or NOEL, LOEL	72 hr EC50=6.87 mg/L based on average specific growth rate; 72-hr EC50=4.56 mg/L calculated using the number of cells/mL; 72-hr EC50= 4.07 mg/L using the area under the

	growth curve. The 72-hr NOEC=2.00 mg/L based on number of cells/mL
Biological observations	Control algal populations grew at an acceptable rate (366,000 cells/ml) after 72 hours. Incubation temperatures were in the range from 23.2 to 24.0 C over the 72 hours and pH was unchanged by the test substance. At the conclusion of the test, samples of test media from each test vessel with maximal growth inhibition were combined with fresh media. After 48 hours incubation the number of cells increased from 850 cells/mL to 68,000 cells/mL at 7.03 mg/L suggesting that the toxic effects were algistatic.
Appropriate statistical evaluations?	EC50 values determined by weighted least squares non-linear regression (Bruce and Versteeg, 1992); NOEC was determined using a one-way analysis of variance (ANOVA) and Bonferroni's test (Gulley et al. 1990)
Conclusion remarks	The acute toxicity of cinnamaldehyde measured as a 50% decrease in growth and reproduction of freshwater algae was estimated to be 72 hr EC50=6.87 mg/L based on average specific growth rate; 72-hr EC50=4.52 mg/L calculated using the number of cells/mL; 72-hr EC50= 4.07 mg/L using the area under the growth curve. The 72-hr NOEC=2.00 mg/L
Reliabilities	Relability code 1. Reliable without restrictions.
Remarks for Data Reliability	OECD 201 Guideline study
References	Ward T. (2003b) The growth and reproduction toxicity test with cinnamaldehyde and freshwater alga, <i>Selenastrum capricornutum</i> . OECD 201. Study No. 2464-FF. Private Communication to FFHPVC. Unpublished Report.
Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Remarks for Substance	Assay:
Method/guideline	OECD 201 Guideline
Test Type	Experimental
GLP	Yes
Year	2003
Species/Strain/Supplier	Green algae/ <i>Selenastrum capricornutum</i> /UTEX 1648
Exposure period (duration)	72 hrs
Analytical monitoring	HPLC/UV detector
Remarks for Test Conditions	Green Algae/ <i>Selenastrum capricornutum</i> /U. of Texas was maintained at test conditions for 14 days prior to the test. The culture was growing in at least 2 subcultures prior to the initiation of the test. In a range finding test, the number of cells/mL was 83 % of controls at 0.10, 46% at 1.0 mg/L, and

<1% at 10 mg/L and 100 mg/L after three days. In the definitive test, algae was treated with nominal concentrations of 0, 0.095, 0.19, 0.38, 0.75, 1.50 and 3.0 mg/L for 72 hours. pH was adjusted to 7.5 and solutions were exposed for 24 hours of light of intensity, 400-410 foot candles. The number of algal cells/mL as well as relative size, cell shapes, color, adherence and aggregation of cells was determined. At 24, 48, and 72 hours 3 treatment and 6 control vessels were sacrificed to determine the number of algal cells/mL. Concentrations were determined by HPLC.

Nominal concentrations as mg/L	0, 0.095, 0.19, 0.38, 0.75, 1.50 and 3.0 mg/L
Measured concentrations as mg/L	Initial mean measured concentrations 0.0934, 0.154, 0.363, 0.651, 1.39, and 2.75 mg/L; Final measured were 81-98% of nominal concentrations
Unit	mg/L
NOEC, LOEC or NOEL, LOEL	72 hr EC50=1.88 mg/L based on average specific growth rate; 72-hr EC50=1.18 mg/L calculated using the number of cells/mL; 72-hr EC50= 1.24 mg/L using the area under the growth curve. The 72-hr NOEC=0.154 mg/mL based on number of cells/mL, average growth rate, or area under the growth curve.
Biological observations	Control algal populations grew at an acceptable rate (312,000 cells/ml) after 72 hours. Incubation temperatures were in the range from 23.7 to 24.0 C over the 72 hours and pH was unchanged by the test substance. At the conclusion of the test, samples of test media from each test vessel with maximal growth inhibition were combined with fresh media. After 48 hours incubation the number of cells increased from 300 cells/mL to 140,000 cells/mL at 2.95 mg/L suggesting that the toxic effects were algistatic.
Appropriate statistical evaluations?	EC50 values determined by weighted least squares non-linear regression (Bruce and Versteeg, 1992); NOEC was determined using a one-way analysis of variance (ANOVA) and Bonferroni's test (Gulley et al. 1990)
Conclusion remarks	The acute toxicity of methylionone measured as a 50% decrease in growth and reproduction of freshwater algae was estimated to be 72 hr EC50=1.88 mg/L based on average specific growth rate; 72-hr EC50=1.18 mg/L calculated using the number of cells/mL; 72-hr EC50= 1.24 mg/L using the area under the growth curve. The 72-hr NOEC=0.154 mg/L
Reliabilities	Relability code 1. Reliable without restrictions.
Remarks for Data Reliability	OECD 201 Guideline study
References	Ward T. (2003c) The growth and reproduction toxicity test with alpha-amylcinnamaldehyde and freshwater alga, <i>Selenastrum capricornutum</i> . OECD 201. Study No. 2462-FF. Private Communication to FFHPVC. Unpublished Report.

Substance Name	Cinnamaldehyde
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CAS No.	104-55-2
Method/guideline	Test compounds were dissolved under sterile conditions in modified KNOP solution. Subsequently, these solutions were measured into a flask to which a growing cell suspension was added. Cultures were shaken for 48 hr, where after the cells were centrifuges.
Species/Strain/Supplier	Chlorella vulgaris
Exposure period	96 hrs
Remarks for Test Conditions	After acidification to 4.0 aqueous solution was extracted w/ ether. Ether fractions were treated w/anhydrous sodium sulfate, filtered & concentrated. Ethanol was added to obtain a final extract of 1 ml. From this extract, a sample was subjected to TLC.
Biological Observations	Cinnamic aldehyde was found to inhibit the algae growth in a concentration as low as 5×10^{-5} M. At the same concentration a stimulation of the respiration of the algae was observed at pH 5.6 & pH 7.2
Conclusion Remarks	Cinnamic aldehyde inhibited the algal growth and stimulated the respiration.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Dedoner, A. and VanSumere, C.F. (1971). The effect pf phenolics and related compounds on the growth and the respiration of Chlorella vulgaris. Z. PflPhysiol 65(1): 70-80.

Substance Name	<i>alpha</i> -Amylcinamaldehyde
CAS No.	122-40-7
Method/guideline	Calculated
Test Type	ECOSAR
Species/Strain/Supplier	Green algae
Exposure period	96 hrs
Conclusion Remarks	EC50 = 0.87 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	ECOSAR

Substance Name	<i>alpha</i> -Hexylcinamaldehyde
CAS No.	101-86-0
Method/guideline	Calculated
Test Type	ECOSAR

Species/Strain/Supplier	Green algae
Exposure period	96 hrs
Conclusion Remarks	EC50 = 0.34 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	ECOSAR

Substance Name	<i>p</i> -tert-Butyl- <i>alpha</i> -methyldihydrocinnamic aldehyde
CAS No.	80-54-6
Method/guideline	Calculated
Test Type	ECOSAR
Species/Strain/Supplier	Green algae
Exposure period	96 hrs
Conclusion Remarks	EC50 = 0.827 mg/l
Remarks for Data Reliability	The data are obtained by a recognized SAR calculation method and are consistent with chemical structure. Data are considered reliable.
References	ECOSAR

4 Human Health Data

4.1 Acute Toxicity

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	LD50 was computed by method of Litchfield & Wilcoxon (1949).
Test Type	Acute Oral LD50
GLP	Not reported
Year	1964
Species/Strain	Guinea pig
Sex	Male and Female

# of animals per sex per dose	NG
Route of administration	Oral
Value LD50 or LC50 with confidence limits	LD50 = 1160 (95% CI 950-1420) mg/kg.
Remarks for Results	The LD50 was reported to be 1160 mg/kg. Coma was reported with higher doses.
Conclusion Remarks	The LD50 was reported to be 1160 (95%CI 950-1420) mg/kg.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal Food Cosmetic Toxicology,
References	Jenner, P. M., Hagan, E.C., Taylor, J.M, Cook, E.L. and Fitzhugh, O.G. (1964). Food Flavorings and Compounds of Related Structure I. Acute Oral Toxicity. Food and Cosmetics Toxicology 2(3): 327-343.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	A group of animals, 6 animals per group per sex were given the test substance by oral gavage.
Test Type	Acute Oral LD50 test
GLP	NG
Year	1974
Species/Strain	Rat/White
Sex	Male and Female
# of animals per sex per dose	6
Vehicle	Sunflower oil
Route of administration	Oral (gavage)
Remarks for Test Conditions	No other details were given
Value LD50 or LC50 with confidence limits	LD50 = 3400 mg/kg or 25.8 mM.
Remarks for Results	No other details were given
Conclusion Remarks	The oral LD50 value for cinnamaldehyde was calculated to be 3400 mg/kg
Data Qualities Reliabilities	Reliability code 3. Data not reliable. The data must be viewed with caution.
Remarks for Data Reliability	Original article is in Russian. English translation doesn't report details or these details are missing in the original article.
General Remarks	Authors claim that the acute oral LD50 values for Cinnamaldehyde for rats, mice and guinea pigs was the same value of 3400 mg/kg.

References

Zaitsev, A, N. and Rakhmanina (1974). Some Data on the Toxic Properties of Phenylethyl and Cinnamyl Alcohol Derivatives. Vopr. Pitaniya 6: 48-53.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	A group of animals, 6 animals per group per sex were given the test substance by oral gavage.
Test Type	Acute Oral LD50 test
GLP	NG
Year	1974
Species/Strain	Mice/White
Sex	Male and Female
# of animals per sex per dose	6
Vehicle	Sunflower oil
Route of administration	Oral (gavage)
Remarks for Test Conditions	No additional details given.
Value LD50 or LC50 with confidence limits	LD50 = 3400 mg/kg or 25.8 mM.
Remarks for Results	No other details were given
Conclusion Remarks	The oral LD50 value for cinnamaldehyde was calculated to be 3400 mg/kg
Data Qualities Reliabilities	Reliability code 3. Data not reliable.
Remarks for Data Reliability	Original article was in Russian. English translation either doesn't report details or these details are missing in the original article.
General Remarks	Authors claim that the acute oral LD50 values for Cinnamaldehyde for rats, mice and guinea pigs was same value of 3400 mg/kg.
References	Zaitsev, A, N. and Rakhmanina (1974). Some Data on the Toxic Properties of Phenylethyl and Cinnamyl Alcohol Derivatives. Vopr. Pitaniya 6: 48-53.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	A group of animals, 6 animals per group per sex were given the test substance by oral gavage.
Test Type	Acute Oral LD50 test
GLP	NG

Year	1974
Species/Strain	Guinea pig
Sex	Male and Female
# of animals per sex per dose	6
Vehicle	Sunflower oil
Route of administration	Oral (gavage)
Remarks for Test Conditions	No additional details given.
Value LD50 or LC50 with confidence limits	LD50 = 3400 mg/kg or 25.8 mM.
Remarks for Results	No other details given
Conclusion Remarks	The oral LD50 value for cinnamaldehyde was calculated to be 3400 mg/kg
Data Qualities Reliabilities	Reliability code 3. Data not reliable. The data must be viewed with caution.
Remarks for Data Reliability	Original article was in Russian. English translation either doesn't report details or these details are missing in the original article
General Remarks	Authors claim that the acute oral LD50 values for Cinnamaldehyde for rats, mice and guinea pigs was same value of 3400 mg/kg.
References	Zaitsev, A, N. and Rakhmanina (1974). Some Data on the Toxic Properties of Phenylethyl and Cinnamyl Alcohol Derivatives. Vopr. Pitaniya 6: 48-53.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The study was performed on albino rabbits according to the method described under section 191.10 of the final order enforcement Regulation, Federal Register Vol. 26, No. 155, p7336, Aug 12, 1961.
Test Type	Acute Dermal LD50
GLP	Not reported
Year	1973
Species/Strain	Rabbit/Albino
Sex	Not reported
# of animals per sex per dose	20
Vehicle	None reported
Route of administration	Dermal

Remarks for Test Conditions	The test substance was applied to the intact or abraded skin of the rabbit. The mortality data was evaluated according to the Thompson moving method as described by Carrol S. Weil. Biometrics 8(3): 249-263, 1952. Doses tested 0.25, 0.50, 1.0, 2.0 & 4.0 ml/kg.
Value LD50 or LC50 with confidence limits	Acute Dermal LD50 & 19/20 Confidence Limit = 0.59 (0.42-0.84) ml/kg. LD50=620 mg/kg bw.
Number of deaths at each dose level	0.25 ml/kg- 0/2 death (Intact or abraded); 0.50 ml/kg- 1/2 deaths in abraded group; 1.0 ml/kg- 2/2 deaths in both intact & abraded group; 2.0 ml/kg- 2/2 deaths in both intact and abraded group; 4.0 ml/kg- 2/2 deaths in both intact & abraded group.
Conclusion Remarks	Cinnamic aldehyde has an acute dermal LD50 and 19/20 Confidence limits of 0.59 0.42-0.884) ml/kg.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
References	Shelanski, M. and Moldovan, M. (1973). Report to RIFM by Food and Drug Research Laboratories. Feb 16, 1973.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Rabbits were dosed dermally with cinnamic aldehyde at 0.59, 0.83, 1.00, 1.23 & 1.50 ml/kg. The test substance was kept in contact with the skin for 24 hours. The animals were observed daily for signs of mortality, toxicity and pharmacological effects.
Test Type	Acute Dermal Toxicity
GLP	Yes
Year	1986
Species/Strain	New Zealand Albino rabbits
Sex	Male and Female
# of animals per sex per dose	4
Route of administration	Dermal
Remarks for Test Conditions	Skin reactions were scored on days 1, 7 and 14. Body weights were recorded pretest and at termination. All animals were examined for gross pathology. The LD50 was calculated by the method of Litchfield and Wilcoxon.
Value LD50 or LC50 with confidence limits	The LD50 and 95% confidence limits are: 1.2 (0.9 - 1.6) ml/kg of the body weight.
Number of deaths at each dose level	0.59 ml/kg= 0 dead/2 treated; 0.83 ml/kg = 2 dead/4 treated; 1.00 ml/kg = 1 dead/4 treated; 1.23 ml/kg = 1 dead/4 treated; 1.50 ml/kg = 4 dead/4 treated.
Remarks for Results	Deaths occurred by day 3, and were preceded with predeath physical signs of few feces, lethargy, ataxia and rales. Necropsy of the deaths revealed abnormalities of the lungs, liver, kidneys, treated skin and GI tract, as well as brown staining of the anogenital area and yellow staining of the nose/mouth area. Survivors: signs of diarrhea, few feces, emaciation, ataxia and limited mobility due to severe skin

Conclusion Remarks	reaction, abnormalities of skin and intestines. Larger than normal uterus.
Data Qualities Reliabilities	The LD50 and 95% confidence limits are: 1.2 (0.9 - 1.6) ml/kg of the body weight. LD50=1260 mg/kg bw
Remarks for Data Reliability	Reliability code 1. Reliable without restrictions.
References	The study was conducted in accordance with GLP
References	Fritzsche Dodge and Olcott, Inc. (1986). Acute Dermal Toxicity of Cinnamaldehyde in Rabbits. Unpublished. Report to RIFM.

Substance Name	p-t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Acute oral toxicity was determined in rats.
Test Type	Acute Oral Toxicity
GLP	NG
Year	1977
Species/Strain	Rats
Sex	Not reported
# of animals per sex per dose	10
Route of administration	Oral
Remarks for Test Conditions	Doses used: 1.22, 2.47, 5.0 and 10.14 g/kg
Value LD50 or LC50 with confidence limits	The oral LD50 and 95% confidence interval are 3.7 (2.6-5.4) g/kg
Number of deaths at each dose level	1.22 g/kg=0/10; 2.47 g/kg= 1/10; 5.0 g/kg= 7/10; 10.14 g/kg = 10/10
Remarks for Results	Toxic signs = 1.22 g/kg: diarrhea; 2.47 g/kg: piloerection, lethargy, flaccid; 5.0 g/kg: lethargy, piloerection, diarrhea, coma; 10.14 g/kg: ataxia, lethargy, piloerection and diarrhea.
Conclusion Remarks	The oral LD50 and 95% confidence interval are 3.7 (2.6-5.4) g/kg. LD50=3700 mg/kg bw.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
References	Moreno O. M. (1977b). Acute Oral toxicity in Rats. Dermal Toxicity in Rabbits. Unpublished. Report to RIFM.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	40 Male Wistar rat strain were used. Rats were observed for signs of toxicity and pharmacologic effect at 1, 6 & 24 hours and daily thereafter for a period of 14 days.
Test Type	Oral LD50

GLP	NG
Year	1971
Species/Strain	Male Wistar rats
Sex	Male
# of animals per sex per dose	10
Route of administration	Oral
Remarks for Test Conditions	Doses tested: 1.78, 2.67, 4.0 and 6.0 gm/kg.
Value LD50 or LC50 with confidence limits	LD50 (95% Confidence Limit) = 3.1 (3.75-2.45) g/kg
Number of deaths at each dose level	1.78 g/kg = 1/10; 2.67 g/kg = 4/10; 4.0 g/kg = 7/10; 6.0 g/kg = 10/10.
Remarks for Results	Symptomology: Depression, Lethargy, Anorexia, Weight loss
Conclusion Remarks	The oral LD50 was reported to be 3.1 g/kg. LD50=3100 mg/kg bw.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
References	Moreno O.M. (1971) Acute toxicity studies in rats, mice, rabbits and guinea pigs. Unpublished report to RIFM.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Acute Dermal toxicity
Test Type	Acute Dermal LD50
GLP	Not reported
Year	1972
Species/Strain	Rabbits
Sex	Not reported
# of animals per sex per dose	6
Vehicle	Not reported
Route of administration	Dermal
Remarks for Test Conditions	Dose tested = 5.0 g/kg
Value LD50 or LC50 with confidence limits	Dermal LD50 <5.0 g/kg.
Number of deaths at each dose level	All animals died overnight after dosing.
Conclusion Remarks	The dermal LD50 value for cinnamic aldehyde in rat is less than 5 g/kg.

Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Shelanski M. and Moldovan, M. (1973). Report to RIFM by Food and Drug Research Laboratories. Feb 16, 1973. Shelanski, M. and Moldovan, M. (1973). Report to RIFM by Food and Drug Research Laboratories. Feb 2, 1973.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Rabbits were dosed dermally with 1000 mg/kg of the test material and kept in contact with the skin for 24 hours. Dermal responses were recorded 24 hours, day 7 and 14 postdose.
Test Type	Dermal LD50
GLP	Yes
Year	1996
Species/Strain	New Zealand White rabbits
Sex	Male and Female
# of animals per sex per dose	5
Vehicle	NG
Route of administration	Dermal
Remarks for Test Conditions	Body weights were recorded pretest and at death, or termination in the survivors. All animals were examined for gross pathology. The test sites were scored using the numerical Draize scoring code. An estimate of the LD50 was made based on the survival during the study.
Value LD50 or LC50 with confidence limits	The LD50 is greater than 1000 mg/kg of body weight.
Number of deaths at each dose level	All animals survived the 1000 mg/kg dermal application.
Remarks for Results	Necropsy revealed treated skin abnormalities in all animals. Liver abnormalities were noted in one animal, and kidney abnormalities in three animals, one of which had wetness of the anogenital area.
Conclusion Remarks	The dermal LD50 was reported to be greater than 1000 mg/kg.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was conducted in accordance with GLP.
References	MB Research Labs (1996) Unpublished Report to RIFM.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2

Method/guideline	Oral LD50
Test Type	Acute Oral LD50
GLP	Not reported
Year	1965
Species/Strain	Rats
Sex	Not reported
# of animals per sex per dose	NG
Vehicle	NG
Route of administration	Oral
Remarks for Test Conditions	Article in Romanian. Details not given in the English abstract.
Value LD50 or LC50 with confidence limits	LD50 = 3350 mg/kg.
Number of deaths at each dose level	Article in Romanian. Details not given in the English abstract.
Remarks for Results	Article in Romanian. Details not given in the English abstract.
Conclusion Remarks	LD50 = 3.350 mg/kg
Data Qualities Reliabilities	Reliability code 3. Data not reliable.
Remarks for Data Reliability	Article in Romanian. Details not given in the English abstract.
References	Sporn A. (1965). Investigation of the Toxicity of Cynamic Aldehyde. Igiena 14(6): 339-346.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	LD50
Test Type	Intraperitoneal LD50
GLP	Not reported
Year	1965
Species/Strain	Mice
Sex	Not reported
# of animals per sex per dose	NG
Vehicle	NG
Route of administration	Intraperitoneal

Remarks for Test Conditions	Article in Romanian. Details not given in the English abstract.
Value LD50 or LC50 with confidence limits	LD50 = 2318 mg/kg.
Remarks for Results	Article in Romanian. Details not given in the English abstract.
Conclusion Remarks	Intraperitoneal LD50 for Cinnamaldehyde in mice was shown to be 2318 mg/kg.
Data Qualities Reliabilities	Reliability code 3. Data not reliable.
Remarks for Data Reliability	Article in Romanian. Details not given in the English abstract.
References	Sporn A. (1965). Investigation of the Toxicity of Cynamic Aldehyde. Igiena 14(6): 339-346.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	LD50 was computed by method of Litchfield & Wilcoxon (1949).
Test Type	Acute Oral LD50
GLP	Not reported
Year	1964
Species/Strain	Osborne-Mendel rats
Sex	Male and Female
# of animals per sex per dose	10
Vehicle	None
Route of administration	Oral
Value LD50 or LC50 with confidence limits	LD50 = 2220 (1910-2600) mg/kg.
Number of deaths at each dose level	NG
Remarks for Results	The LD50 was reported to be 2220 mg/kg. Depression, diarrhea and scrawny appearance were noted.
Conclusion Remarks	The LD50 was reported to be 2220 (1910-2600) mg/kg.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal Food Cosmetic Toxicology,
References	Jenner, P. M., Hagan, E.C., Taylor, J.M, Cook, E.L. and Fitzhugh, O.G. (1964). Food Flavorings and Compounds of Related Structure I. Acute Oral Toxicity. Food and Cosmetics Toxicology 2(3): 327-343.
Substance Name	<i>alpha</i> -Hexylcinnamaldehyde

CAS No.	101-86-0
Method/guideline	Six rabbits were used at 3 different dose levels 1, 2 & 3 g/kg. Chemical was applied to clipped area and was occluded for 24 hrs and the animals were observed for 7 days.
Test Type	Acute Dermal Toxicity test
GLP	NG
Year	1971
Species/Strain	Rabbits
Sex	Female
# of animals per sex per dose	2
Route of administration	Dermal
Remarks for Test Conditions	Highest dose was limited by the area available for treatment as well as by the chemical available.
Value LD50 or LC50 with confidence limits	The dermal lethal dose of the test substance was reported to be greater than 3 g/kg.
Number of deaths at each dose level	No animals died at any dose level tested.
Remarks for Results	Moderate erythema was seen. Occasional sloughing was seen but this was in large part due to damage caused by the removal of the tape from the skin.
Conclusion Remarks	The dermal lethal dose of the test substance was reported to be greater than 3 g/kg. Dermal LD50>3000 mg/kg bw.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
References	Moreno O.M. (1971) Acute toxicity studies in rats, mice, rabbits and guinea pigs. Unpublished report to RIFM.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Acute dermal toxicity was determined in rabbits.
Test Type	Acute Dermal Toxicity
GLP	NG
Year	1977
Species/Strain	Rabbits
Sex	Not reported
# of animals per sex per dose	10
Vehicle	Not reported
Route of administration	Dermal

Value LD50 or LC50 with confidence limits	The dermal LD50 value for Lilial was calculated to be greater than 5 g/kg.
Number of deaths at each dose level	No death occurred
Remarks for Results	Mild redness was seen in 4 animals; moderate redness in 6 animals, mild edema in 7 animals and moderate edema in 3 animals.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Conclusion Remarks	The dermal LD50 value for Lilial was calculated to be greater than 5000 mg/kg.
References	Moreno O. M. (1977b). Acute Oral toxicity in Rats. Dermal Toxicity in Rabbits. Unpublished. Report to RIFM.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde, light brown liquid with aromatic odor
CAS No.	101-86-0
Method/guideline	5 Sprague-Dawley rats per sex per dose received a single 4 hr exposure to aerosol containing test substance. Animals were observed for 14 days for body weight changes, mortality, clinical signs, gross and histopathological changes.
Test Type	Acute Inhalation toxicity
GLP	NG
Year	1980
Species/Strain	Sprague-Dawley rats
Sex	Male and Female
# of animals per sex per dose	5
Route of administration	Inhalation
Remarks for Test Conditions	The nominal chamber concentration, calculated from airflow and quantity of test article consumed was 5.00 mg/L. The mean value for the measured concentration was 2.12 mg/L in the chamber.
Value LD50 or LC50 with confidence limits	LC50> 5 mg/L
Number of deaths at each dose level	No deaths were reported
Remarks for Results	Enlarged bronical lymph nodes sometimes accompanied by pulmonary congestion, multiple grey-green pinpoint foci in the lungs, minimal loss of body weight on the days immediately following treatment.
Conclusion Remarks	The acute median lethal concentration was calculated to be greater than 5.00 mg/L expressed in terms of nominal concentration.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Breckenridge C. (1980). The acute toxicity of inhaled hexyl cinnamic aldehyde in the albino rats. Unpublished. Report to RIFM.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde, clear liquid.
CAS No.	80-54-6
Method/guideline	Test substance was applied at a dose of 5 ml/kg to the shaved skin of three rabbits of each sex and occluded for 24 h after which the rabbits were observed for 14 days for overt toxic signs and mortality.
Test Type	Acute Dermal Toxicity
GLP	Yes
Year	1979
Species/Strain	Albino New Zealand rabbits
Sex	Male and Female
# of animals per sex per dose	3
Route of administration	Dermal
Remarks for Test Conditions	
Value LD50 or LC50 with confidence limits	Dermal LD50 > 5 ml/kg
Number of deaths at each dose level	There were no deaths.
Remarks for Results	Treatment caused moderate erythema and thickened, wrinkled skin in all test animals, persisting through Day 9. Subcapsular (agonal) hemorrhages of the kidneys were found at necropsy in most of the test animals.
Conclusion Remarks	The acute dermal LD50 for the test substance was reported to be greater than 5 ml/kg. Acute dermal LD50>5250 mg/kg bw.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was conducted in accordance with GLP.
References	Slepetys (1979). Cosmopolitan Safety Evaluation Unpublished Report. FEMA 15027.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Acute dermal toxicity was determined in rabbits.
Test Type	Acute Dermal Toxicity
GLP	NG
Year	1973
Species/Strain	Rabbits

Sex	Not reported
# of animals per sex per dose	4
Vehicle	Not reported
Route of administration	Dermal
Value LD50 or LC50 with confidence limits	The dermal LD50 value for <i>alpha</i> -amylcinnamaldehyde was calculated to be greater than 2000 mg/kg.
Number of deaths at each dose level	No death occurred
Remarks for Results	The was no evidence of toxicity at 2000 mg/kg bw
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Conclusion Remarks	The dermal LD50 value for <i>alpha</i> -amylcinnamaldehyde was calculated to be greater than 2000 mg/kg.
References	Moreno O. M. (1973). Acute Oral toxicity in Rats. Dermal Toxicity in Rabbits. Unpublished. Report to RIFM.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	LD50 was computed by method of Litchfield & Wilcoxon (1949).
Test Type	Acute Oral LD50
GLP	Not reported
Year	1964
Species/Strain	Rst/Osborne-Mendel
Sex	Male and Female
# of animals per sex per dose	5
Vehicle	None
Route of administration	Oral
Value LD50 or LC50 with confidence limits	LD50 = 3730 (95% CI, 3190-4370) mg/kg. Slope function with 95% confidence interval=1.4 (1.2-1.6)
Number of deaths at each dose level	NG
Remarks for Results	The LD50 was reported to be 3730 mg/kg. Depression, porphyrin-like deposit around eyes and nose.
Conclusion Remarks	The LD50 was reported to be 3730 (3190-4370) mg/kg.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal Food Cosmetic Toxicology,
References	Jenner, P. M., Hagan, E.C., Taylor, J.M, Cook, E.L. and Fitzhugh, O.G. (1964). Food Flavorings and Compounds of

4.2 *In Vitro* Genotoxicity

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Cinnamaldehyde was tested for its antimutagenic effect on mitomycin C pretreated cells.
Test Type	Sister Chromatid Exchange
System of Testing	Chinese Hamster ovary cell
GLP	NG
Year	1987
Species/Strain	Chinese Hamster Ovary cells
Doses/Concentration	0-20 uM
Statistical Methods	NG
Remarks for Test Conditions	Chinese hamster ovary cells were treated in fresh medium containing the mutagen for 22 h. After treatment, cells were washed & incubated with cinnamaldehyde for 22 h. BudR at 20 uM was added. Mitotic cells were collected by the addition of colchicine.
Results	No increase in the frequencies of Sister Chromatid Exchange was observed after cells were treated with cinnamaldehyde alone. However, pretreatment of cells with mitomycin C resulted in increase in the frequency.
Cytotoxic concentration	NG
Genotoxic effects	None
Statistical results	NG
Conclusion Remarks	No evidence of mutagenicity by itself but increased the mutagenicity of mitomycin C.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Sasaki, Y.F., Imanishi, H., Ohta, T. and Shirasu, Y. (1987), Effects of antimutagenic flavourings on SCEs induced by chemical mutagens in cultured Chinese hamster cells. Mutation Research 189: 313-318.
Substance Name	Cinnamaldehyde

CAS No.	104-55-2
Method/guideline	Ames
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1980
Species/Strain	Salmonella typhimurium/TA100
Metabolic Activation	With and without rat liver microsome fraction S9 from Aroclor induced rats
Doses/Concentration	0.1, 0.2, 0.3 0.5, 1.2, 3 & 5 umoles/plate (13.2 to 320 ug/plate)
Statistical Methods	NG
Results	No mutagenic effects. Cinnamaldehyde and <i>alpha</i> -methylcinnamaldehyde were non-mutagenic for Salmonella typhimurium TA100 both in the presence or absence of aroclor 1254 induced rat liver S9 mix.
Cytotoxic concentration	NG
Genotoxic effects	None
Statistical results	NG
Remarks for Results	Chloro or bromo substitution in the <i>alpha</i> -carbon position of cinnamaldehyde leads to the derivatives that are strongly mutagenic in Salmonella Typhimurium TA100.
Conclusion Remarks	No mutagenic activity
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Neudecker, T., Ohrlein, K, Eder, E and Henschler, D. (1983). Effect of Methyl and Halogen Substitutions in the <i>alpha</i> C position on the Mutagenicity of Cinnamaldehyde. Mutation Research 110: 1-8.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Salmonella typhimurium strains TA97a, TA100, TA102 & TA104 in the presence and absence of aroclor-induced liver S9s from F344 rats & B6C3F1 mice.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	No

Year	1998
Species/Strain	Salmonella typhimurium/TA97a, TA100, TA102 and TA104
Metabolic Activation	With and without mice liver microsome fraction S9 from Aroclor induced rats and mice.
Doses/Concentration	25, 50, 100, 200 and 300 ug/plate
Statistical Methods	Dunnett's t-test and Wahrendorf ranking and linear regression.
Remarks for Test Conditions	Positive control: 2-aminoanthracene.
Results	<i>trans</i> -Cinnamaldehyde exhibited a weak mutagenic response in TA100 with mouse liver S9 mix.
Cytotoxic concentration	NG
Genotoxic effects	Weak mutagenic response
Statistical results	NG
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Dillon, D., Combes, R. and Zeiger, E. (1998). The Effectiveness of Salmonella Strains TA100, TA102 and TA104 for Detecting Mutagenicity of Some Aldehydes and Peroxides. Mutagenesis 13(1): 19-26.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The mutagenicity test was conducted in the Salmonella/microsome mutagenicity assay on plates according to the method of Ames with the Salmonella typhimurium TA98 and TA100.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1982
Species/Strain	Salmonella typhimurium TA 98, TA 100
Metabolic Activation	Rat-liver microsome (S9) was prepared from Sprague-Dawley rats treated with Aroclor 1254
Doses/Concentration	0.05 to 500 ug/plate.
Statistical Methods	NG
Remarks for Test Conditions	Diluted in DMSO
Results	Negative

Cytotoxic concentration	Not reported
Genotoxic effects	Negative
Statistical results	NG
Conclusion Remarks	No mutagenic effects
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Kasamaki, A., Takahashi, H., Tsumura, N., Niwa, J., Fujita, T., and Urasawa, S. (1982). Genotoxicity of Flavoring Agents. Mutation Research 105:387-392.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Exponentially growing Chinese-hamster B241 were exposed to the test substance for 24 hr and then incubated for another 24 hrs without the test chemical followed by treatment with colchicine.
Test Type	Chromosomal Aberration Test
System of Testing	Non Bacterial
GLP	NG
Year	1982
Species/Strain	Chinese hamster cell line B241
Metabolic Activation	Rat-liver microsome (S9) was prepared from Sprague-Dawley rats treated with Aroclor 1254. Rat-liver microsome (S9) was prepared from Sprague-Dawley rats treated with Aroclor 1254.
Doses/Concentration	Several doses up to 10 nM.
Statistical Methods	Chi-Square test
Remarks for Test Conditions	The test chemical was dissolved in DMSO at a concentration of 50 mM and then was diluted with the medium. Control cells were treated with a medium containing DMSO equal to the test solution.
Results	trans-Cinnamaldehyde exhibited high potential for inducing aberrations. The total frequency of the aberrations indicated a dose-dependent increase at a certain dose range. DMSO did not affect the frequency or the type of spontaneous aberrations
Cytotoxic concentration	Not reported
Genotoxic effects	Chromosomal aberrations
Statistical results	NG
Remarks for Results	Chromatid break, chromosome break, chromatid exchange, ring or dicentric chromosomes, fragmentation, translocation and

pulverization were observed.

Conclusion Remarks	Severe chromosome aberrations were observed in the cells treated with Cinnamaldehyde,
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Kasamaki, A., Takahashi, H., Tsumura, N., Niwa, J., Fujita, T., and Urasawa, S. (1982). Genotoxicity of Flavoring Agents. Mutation Research 105:387-392.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The mutagenicity assay with Salmonella typhimurium was conducted as described by Ames et al with tester strain TA100 and TA98. S9 was prepared from the PCB-treated male Sprague-Dawley rats.
Test Type	Reverse Mutation assay
System of Testing	Bacterial
GLP	NG
Year	1982
Species/Strain	Salmonella typhimurium/TA100, TA98, TA1535, TA1537 and TA1538.
Metabolic Activation	S9 fraction was prepared from the PCB-treated male Sprague-Dawley rats
Doses/Concentration	60, 120, 300 and 600 ug/plate.
Statistical Methods	None performed
Remarks for Test Conditions	Histidine-independent colonies were scored after incubation at 37C for 48-72 h.
Results	No significant increase in revertant number with Salmonella strains in the presence or absence of S9 fraction.
Cytotoxic concentration	600 ug/plate
Genotoxic effects	Negative
Statistical results	NG
Conclusion Remarks	Cinnamaldehyde was not found to be mutagenic under the test conditions
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Sekizawa, J. and Shibamoto, T. (1982). Genotoxicity of Safrole-Related Chemicals in Microbial Test Systems. Mutation Research 101: 127-140.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The mutagenicity assay with E. coli WP2uorA trp- was performed according to the method described by Green and Murial (1976).
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1982
Species/Strain	E. coli/WP2 uorA trp-
Metabolic Activation	S9 fraction was prepared from the PCB-treated male Sprague-Dawley rats
Doses/Concentration	60, 120, 300 and 600 ug/plate.
Statistical Methods	NG
Remarks for Test Conditions	After 48-72 h incubation at 37 °C, revertant colonies were counted.
Results	No mutagenic effects.
Cytotoxic concentration	600 ug/plate
Genotoxic effects	None
Statistical results	NG
Conclusion Remarks	No evidence of mutagenicity was seen under the test condition.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Sekizawa, J. and Shibamoto, T. (1982). Genotoxicity of Safrole-Related Chemicals in Microbial Test Systems. Mutation Research 101: 127-140.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The DNA-repair test with Bacillus subtilis was performed as described by Kada et al. (1980).
Test Type	DNA-Repair test
System of Testing	Bacterial
GLP	NG
Year	1986

Species/Strain	Bacillus subtilis/H17 Rec+ or M45 Rec-
Metabolic Activation	S9 fraction was prepared from the PCB-treated male Sprague-Dawley rats.
Doses/Concentration	0.2 mg/disk
Statistical Methods	NG
Results	No mutagenic effects in the absence of S9 fraction. DNA-repair tests with S9 were not successful.
Genotoxic effects	None
Statistical results	NG
Conclusion Remarks	No evidence of mutagenicity was detected under the test conditions.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Sekizawa, J. and Shibamoto, T. (1982). Genotoxicity of Safrole-Related Chemicals in Microbial Test Systems. Mutation Research 101: 127-140.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Ames test was performed on five tester strains of Salmonella typhimurium (TA 1535, TA 100, TA 1537, TA 1538, TA 98).
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1983
Species/Strain	Salmonella typhimurium (TA 1535, TA 100, TA 1537, TA 1538, TA 98).
Metabolic Activation	S-9 liver fraction was prepared from Aroclor-pretreated rats (Aroclor 1254, 500 mg/kg, ip).
Doses/Concentration	up to 3600 ug/plate
Statistical Methods	Statistical significance was determined according to the methods of Kastenbaum and Bowman (1970).
Remarks for Test Conditions	Positive controls were run in each experiment with the reference mutagens sodium azide and benzo[a]pyrene.
Results	No mutagenic activity was detected with any of the Salmonella strains tested.
Cytotoxic concentration	NG
Genotoxic effects	None
Conclusion Remarks	No mutagenic activity was detected with any of the Salmonella strains tested.

Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Wild, D., King, M.-T., Gocke, E. and Eckhardt. (1983). Study of Artificial Flavouring Substances for Mutagenicity in the Salmonella/Microsome, BASC and Micronucleus Tests. <i>Fd. Chem. Toxicol.</i> 21(6): 707-719.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The antimutagenic effect of Cinnamaldehyde (CA) on the induction of HGPRT- mutants by methyl methanesulfonate (MMS), N-nitroso-N-methylurea (MNU), ethyl methanesulfonate (EMS) and UV light was investigated in the Chinese hamster V79 cell line.
Test Type	HGPRT- Mutants
System of Testing	Cell line
GLP	NG
Year	1994
Species/Strain	Chinese hamster/V79 cell line
Metabolic Activation	None
Doses/Concentration	50 or 100 mM.
Statistical Methods	Student t-test
Remarks for Test Conditions	Cells were seeded & then treated with UV light (12 J/m ³) or MMS (2 mM), EMS (30 mM) or MNU (1 mM) for 1 h. Then the cells were washed 2X & the incubation was continued with fresh medium containing CA (0, 50 or 100 mM) for 2 or 4 h. Cell was washed, trypsinized & were seeded. The survival was measured by seeding 10E2 cells in a fresh medium. Mutation frequency was calculated as mutants/10E6 viable cells.
Results	No mutagenic effect of CA; did not modify the mutation frequency when given to cells simultaneously with chemical mutagens MNU, EMS. MMS or UV; increased the cytotoxicity of MMS but not of MNU & EMS
Cytotoxic concentration	150 uM
Genotoxic effects	None
Conclusion Remarks	Cinnamaldehyde inhibits some cellular function(s) promoting the repair of a variety of different cytotoxic lesions. At the same time, stimulation by Cinnamaldehyde of an error-free DNA repair mechanism acting on methyl methanesulfonate induced mutagenic damage was indicated.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.

Remarks for Data Reliability	Study was published in a peer review journal.
References	Fiorio, R. and Bronzetti, G.(1994). Effects of Cinnamaldehyde on Survival and Formation of HGPRT- Mutants in V79 Cells Treated with Methyl Methanesulfonate, N-Nitroso-N-Methylurea, Ethyl Methanesulfonate and UV Light. Mutation Research 324: 51-57.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The chemical was tested in Strains of Salmonella using a liquid preincubation procedure.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1985
Species/Strain	Salmonella typhimurium/TA104 & TA102
Metabolic Activation	None
Doses/Concentration	Tested up to the toxic concentration. (Unspecified)
Remarks for Test Conditions	Use of two strains, TA104 and TA102 is described.
Results	Negative
Genotoxic effects	No mutagenic activity was reported.
Conclusion Remarks	No mutagenic activity of Cinnamaldehyde was detected by the use of two new base substitution strains TA104 and TA102.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Marnett, L.J., Hurd, H.K., Hollstein, M.C., Levin, D.E., esterbauer, H., and Ames, B.N. (1985). Naturally Occurring Carbonyl Compounds are Mutagens in Salmonella Tester Strain TA104. Mutation Research 148: 25-34.

Substance Name	<i>trans</i> -Cinnamaldehyde (>95% pure)
CAS No.	104-55-2
Method/guideline	Cinnamaldehyde was tested for mutagenicity in five strains of Salmonella typhimurium both in the presence or absence of S-9 mix. Both the plate incorporation tests and the liquid preincubation assay were performed.
Test Type	Reverse Mutation

System of Testing	Bacterial
GLP	NG
Year	1980
Species/Strain	Salmonella typhimurium/TA1535, TA1537, TA1538, TA98 and TA100
Metabolic Activation	Rat or hamster liver homogenates from animals stimulated with Aroclor 1254 (500 mg/kg 5 days).
Doses/Concentration	1- 500ug/plate
Results	Negative
Genotoxic effects	None
Conclusion Remarks	No mutagenic activity of cinnamaldehyde was detected either by the plate incorporation test or by the liquid preincubation assay in the presence or absence of rat or hamster S-9 fraction.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Lijinsky, W. and Andrews A.W. (1980). Mutagenicity of Vinyl Compounds in Salmonella Typhimurium. Teratogenesis, Carcinogenesis and Mutagenesis 1: 259-269.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Reverse mutation assay using Salmonella typhimurium strains TA92, TA1535, TA100, TA1537, TA94 and TA98 was carried out according to the method of Ames.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1984
Species/Strain	Salmonella typhimurium/TA92, TA1535, TA100, TA1537, TA94 and TA98
Metabolic Activation	Liver microsome fraction (S-9) prepared from the liver of Fischer rats pretreated 5 days before with polychlorinated biphenyls (500 mg/kg, ip).
Remarks for Test Conditions	Solvent used DMSO
Results	Cinnamic aldehyde induced 222 revertants (146 in control) at 0.5 mg/plate and 318 revertants (139 in control) at 0.1 mg/plate in TA100 with and without S-9 mix, respectively.
Genotoxic effects	Positive
Conclusion Remarks	Cinnamic aldehyde was reported to be mutagenic in Salmonella typhimurium strain TA100 in the presence and absence of S-9 mix.

Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Ishidate, M., Sofuni, T., Yoshikawa, K., Hauashi, M., Nohmi, T., Sawada, M. and Matsuoka. (1984). Primary Mutagenicity Screening of Food Additives Currently Used in Japan. <i>Fd. Chem. Toxic.</i> 22(8) 623-636.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Ames test was performed on two tester strains of Salmonella typhimurium TA 97 and TA 102.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1987
Species/Strain	Salmonella typhimurium/TA97 and TA 102
Metabolic Activation	S-9 liver fraction was prepared from Aroclor-pretreated rats (Aroclor 1254, 500 mg/kg, ip).
Doses/Concentration	1-1000 ug/plate
Statistical Methods	Kruskal-Wallis test
Remarks for Test Conditions	Preincubation method using positive controls of 9-AA (20 ug/plate) for TA 97 with activation and 5 ug/plate without activation (S-9). Positive control for TA 102 was MMC (0.5 ug/plate) without activation and 9-AA (5 ug/plate) without activation.
Results	No mutagenic effects with or without S9 activation
Genotoxic effects	None
Conclusion Remarks	No mutagenic activity was detected with any of the Salmonella strains tested.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Fujita H. and Sasaki M (1987) Mutagenicity Test of food additives with Salmonella Typhirium TA 97 and TA102. <i>Annals of Tokyo Metr. Research Laboratory</i> P.H. 38:423-430.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Ames test was performed on five tester strains of Salmonella typhimurium (TA 1535, TA 100, TA 1537, TA 1538, TA 98).

Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1983
Species/Strain	Salmonella typhimurium (TA 1535, TA 100, TA 1537, TA 1538, TA 98.
Metabolic Activation	S-9 liver fraction was prepared from Aroclor-pretreated rats (Aroclor 1254, 500 mg/kg, ip).
Doses/Concentration	up to 3600 ug/plate
Statistical Methods	Statistical significance was determined according to the methods of Kastenbaum and Bowman (1970).
Remarks for Test Conditions	Positive controls were run in each experiment with the reference mutagens sodium azide and benzo[a]pyrene.
Results	No mutagenic activity was detected with any of the Salmonella strains tested.
Cytotoxic concentration	NG
Genotoxic effects	None
Conclusion Remarks	No mutagenic activity was detected with any of the Salmonella strains tested.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Wild D., King, M.T., Gocke, E. and Eckhardt. (1983). Study of Artificial Flavouring Substances for Mutagenicity in the Salmonella/Microsome, BASC and Micronucleus tests Food and Chemical Toxicology 21(6), 707-719.

Substance Name	<i>p</i> -tert-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Ames test was performed on five tester strains of Salmonella typhimurium (TA 1535, TA 100, TA 1537, TA 1538, TA 98.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1984
Species/Strain	Salmonella typhimurium/TA 1535, TA 100, TA 1537, TA 1538, TA 98
Metabolic Activation	4 or 10% Aroclor-induced S9 fraction prepared from the PCB-treated male Sprague-Dawley rats
Doses/Concentration	0.0078 to 0.125 ul/plate
Statistical Methods	NG

Remarks for Test Conditions	Solvent, Ethanol. Plate incorporation method using positive controls of 2-acetylaminofluorene (2ug/plate) for TA 98 and TA1538, mitomycin C (1 ug/plate) for TA102, so with activation and 5 ug/plate without activation (S-9). Positive control.
Results	No mutagenic activity was detected with any of the Salmonella strains tested with or without S9 activation.
Cytotoxic concentration	NG
Genotoxic effects	None
Conclusion Remarks	No mutagenic activity was detected with any of the Salmonella strains tested.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Basic data given comparable to guidelines/standards.
References	Givaudan-Roure (1984) Mutagenicity evaluation of <i>p-t-butyl-alpha-methylhydrocinnamaldehyde</i> in the Salmonella/mammalian plate incorporation assay. Unpublished Report to RIFM.

Substance Name	<i>p</i> -tert-Butyl- <i>alpha</i> -methylidihydrocinnamaldehyde
CAS No.	122-40-7
Method/guideline	Ames test was performed on five tester strains of Salmonella typhimurium (TA 1535, TA 100, TA 1537, TA 98).
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1991
Species/Strain	Salmonella typhimurium/TA 1535, TA 100, TA 1537, TA 98.
Metabolic Activation	S9 fraction was prepared from the PCB-treated male Sprague-Dawley rats.
Doses/Concentration	2.5 to 750 ug/plate without activation and 250 ug/plate with activation.
Statistical Methods	NG
Remarks for Test Conditions	Solvent, DMSO.
Results	No mutagenic activity was detected with any of the Salmonella strains tested with or without S9 activation.
Cytotoxic concentration	667 ug/plate with (+S9), 333 ug/plate (-S9)
Genotoxic effects	None
Statistical results	NG
Conclusion Remarks	No mutagenic activity
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.

Remarks for Data Reliability Basic data given comparable to guidelines/standards.

References Wagner V.O., and Twarszik, S. C. (1999) Bacterial reverse mutation assay of *p*-t-butyl-*alpha*-methyldihydrocinnamic aldehyde. Unpublished journal.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Chromosomal aberration test was carried out using a Chinese hamster fibroblast cell line, CHL. The cells were exposed to 3 different doses for 24 and 48 hours. No metabolic activation system was applied.
Test Type	Chromosomal aberration test
System of Testing	Chinese hamster fibroblast cell line CHL.
GLP	NG
Year	1984
Species/Strain	Chinese hamster fibroblast cell line CHL.
Metabolic Activation	None
Doses/Concentration	Max. dose = 0.015 mg/ml
Remarks for Test Conditions	For quantitative evaluation of the clastogenic potential, the D20 was calculated, which is the dose (mg/ml) at which structural aberrations (including gaps) were detected in 20% of the metaphases observed. In addition, the TR value was calculated, which indicates the frequency of cells with exchange-type aberrations per unit dose (mg/ml). TR values are relatively high for chemicals that show carcinogenic potential in animals.
Results	Cinnamic aldehyde was positive in chromosomal aberration test. TR value was 2133 and D20 = 0.01. It was also positive at 0.01 mg/ml at 24 h (20.0%, total incidence of cells with aberrations) and at 48 hr (15%, total incidence of cells with aberrations). The results were considered positive if the total incidence of cells with aberrations was 10.0% or more.
Genotoxic effects	Positive
Conclusion Remarks	Cinnamic aldehyde was shown to be positive in chromosomal aberration test.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Ishidate, M., Sofuni, T., Yoshikawa, K., Hauashi, M., Nohmi, T., Sawada, M. and Matsuoka. (1984). Primary Mutagenicity Screening of Food Additives Currently Used in Japan. <i>Fd. Chem. Toxic.</i> 22(8) 623-636.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The test chemical was screened for mutagenic activity using Salmonella typhimurium strains TA97, TA98, and TA100 with and without S9 metabolic activation using prolonged, non-standard preincubation time of up to 120 minutes.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1995
Species/Strain	Salmonella typhimurium Strain TA97, TA98 and TA100
Metabolic Activation	S9 fraction used but source not specified
Results	No mutagenic activity was detected
Genotoxic effects	None
Statistical results	NG
Data Qualities Reliabilities	Data appears to be reliable.
Remarks for Data Reliability	Reliability code 2. Reliable with restrictions.
References	Azizian, A. and Blevins, R.D. (1995). Mutagenicity and Antimutagenicity Testing of Six Chemicals Associated with the Pungent Properties of Specific Spices as Revealed by the Ames Salmonella/Microsomal Assay, Arch. Environ. Contam. Toxicol. 28: 248-258.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The genotoxicity of cinnamaldehyde was studied by a bacterial mutation test in the Salmonella/microsome system with and without rat-liver microsome as the metabolic activation system.
Test Type	Reverse Mutation
System of Testing	Bacterial
GLP	NG
Year	1982
Species/Strain	Salmonella typhimurium Strain TA98 and TA100
Metabolic Activation	Rat-liver microsomes
Doses/Concentration	0.05 to 500 ug/plate

Results	Test substance did not induce a number of revertants that was over half of the number of spontaneous revertants of TA98 or TA100 either with or without S9 mix. Considerable mutagenic activity was seen in positive standard mutagens.
Genotoxic effects	None
Conclusion Remarks	Cinnamaldehyde did not induce a number of revertants that was over half of the number of spontaneous revertants of TA98 or TA100 either with or without S9 mix.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Study was published in a peer review journal.
References	Kasamaki, A., Takahashi, H, Niwa, J., Fujita, T. and Urasawa, S. (1982). Genotoxicity of Flavoring Agents. Mutation Research 105: 387-392.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Cinnamaldehyde was tested for genotoxicity using CH cell line B241 in culture stages between the 5th and 8th passages.
Test Type	Chromosomal aberration
System of Testing	Cell line
GLP	NG
Year	1982
Species/Strain	Chinese Hamster cell line B241
Metabolic Activation	Rat liver microsome from Sprague-Dawley rats treated with Aroclor 1254
Remarks for Test Conditions	One day after seeding, exponentially growing cells were exposed to the test chemical for 24 hrs, then incubated for another 24 hrs without chemical followed by treatment with colchicine (1 X 10 ⁻⁷ M) for 2-3 hrs. Chromosome samples were prepared by the Giemsa staining method. Control cell cultures were treated with a medium containing DMSO equal in its concentration to the test solution of test chemical. The percentage of chromosome aberration was computed by scoring about 200 metaphase spreads, each containing 20-26 chromosomes.
Results	Cinnamaldehyde induced severe chromosome aberration in the treated CH cells suggesting a potential genotoxicity.
Genotoxic effects	Induced severe chromosome aberration
Remarks for Results	Various types of aberrations were observed in the treated cells, such as severe chromatid break, chromosome break, chromatid exchange, ring or dicentric chromosomes, fragmentation, translocation and pulverization.
Conclusion Remarks	Cinnamaldehyde induced severe chromosome aberration in the treated CH cells suggesting a potential genotoxicity.

Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer review journal.
References	Kasamaki, A., Takahashi, H, Niwa, J., Fujita, T. and Urasawa, S. (1982). Genotoxicity of Flavoring Agents. Mutation Research 105: 387-392.

4.3 *In Vivo* Genotoxicity

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Mouse bone marrow micronucleus assay.
Test Type	Micronucleus Test
GLP	NG
Year	1984
Species/Strain	Mice/ddY
Sex	Male
Route of administration	Intraperitoneal
Doses/concentrations	125, 250, 500 & 1000 mg/kg
Exposure period	18, 24, 30, 48, or 72 hrs
Remarks for Test Condition	Mice received one of the 4 different doses of the test material by IP and were killed after a time interval of 18, 24, 30, 48 or 72 hr following injection. Femoral marrow cells were smeared, fixed and stained. 100 polychromatic erythrocytes were scored and the number of micronucleated polychromatic erythrocytes were recorded.
Genotoxic effects	Not genotoxic
Remarks for Results	Micronucleated polychromatic erythrocytes did not increase in any dose or any sampling time. At 500 mg/kg more than 1 animal died; at 1000 mg/kg all animals died.
Conclusion Remarks	No evidence of genotoxicity.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Hayashi, M., Sofuni, T and Ishidate, M. (1984). A Pilot Experiment for the Micronucleus Test. The multi-sampling at multi-dose levels method. Mutation Research 141: 165-169.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Mouse
Test Type	Micronucleus test
GLP	NG
Year	1990
Species/Strain	ddY mice
Sex	Male
Route of administration	Oral
Doses/concentrations	250, 313, or 500 mg/kg bw
Exposure period	Single dose
Remarks for Test Condition	Male ddY mice were irradiated with X-ray at 200 rad. After irradiation cinnamaldehyde was administered orally at 250, 313 or 500 mg/kg. In a time course study 500 mg/kg was given to mice immediately after the irradiation and the bone-marrow cells were sampled periodically. The micronucleus assay was performed according to the method described by Schmid 1976.
Genotoxic effects	Not genotoxic
Appropriate statistical evaluations?	Student t-test
Remarks for Results	A dose-dependent decrease in micronucleated polychromatic erythrocytes. At 500 mg/kg, there was 58% decrease in MNPCE. The test material did not increase the frequency of polychromatic erythrocytes, indicating that observed reduction of MNPCE was not a reflection of toxic effect of cinnamaldehyde on the bone-marrow.
Conclusion Remarks	Cinnamaldehyde reduced the frequency if X-ray induced micronuclei with toxicity of the test chemical to the bone marrow.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Sakasi, Y. F., Ohta, T., Imanishi, H, Watanabe, M., Matsumoto, K., Kato, T., and Shirasu, Y. (1990). Suppressing Effects of Vanilin, Cinnamaldehyde, and Anisaldehyde on Chromosome aberrations induced by X-rays in mice. Mutation Research 243: 299-302.
Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	DNA Fragmentation/Alkaline Elution Assay

Test Type	DNA Fragmentation/Alkaline Elution Assay
GLP	NG
Year	1994
Species/Strain	Sprague-Dawley rats
Sec	Male
Route of administration	Oral
Doses/concentrations	1100 mg/kg
Exposure period	Single dose. Animals killed after 3 hrs.
Remarks for Test Condition	Male albino Sprague-Dawley rats were given by gastric intubation a single dose (1100 mg/kg) of Cinnamaldehyde in carboxymethylcellulose. Rats were killed 3 hrs after treatment. DNA fragmentation (Single Strand break &/or Alkali-labile sites) was evaluated by the Alkaline Elution Technique.
Genotoxic effects	None
Remarks for Results	Cinnamaldehyde did not induce DNA fragmentation in liver and gastric mucosa as evaluated by the alkaline elution technique.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Mereto, E., Brambilla-Campart, G., Ghia, M., Martelli, A., and Brambilla, G. (1994). Cinnamaldehyde-induced micronuclei in rodent liver. Mutation Research 322: 1-8.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Cinnamaldehyde induced micronuclei in rodent liver was investigated.
Test Type	Micronuclei Assay
GLP	NG
Year	NG
Species/Strain	Male Albino Sprague-Dawley rats
Sex	Male
Route of administration	Oral
Doses/concentrations	550, 1100 or 1650 mg/kg.
Exposure period	Single oral dose

Remarks for Test Condition	Animals were subjected a 2/3 hepatectomy 20 hrs before dosing in order to determine the clastogenic effect on hepatocytes and were killed 48 hrs after cinnamaldehyde administration. The frequency of micronucleated polychromatic erythrocytes was evaluated in marrow, hepatocytes and gastric mucosa.
Genotoxic effects	Not genotoxic
Remarks for Results	No increase in the frequency of MNPCE in bone marrow 48 hrs after administration of cinnamaldehyde; it induced a dose-dependent clastogenic effect in the liver; significantly higher incidence of total nuclear anomalies but not of micronucleated cells in forestomach mucosa
Conclusion Remarks	High doses of cinnamaldehyde may produce a clastogenic effect.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Mereto, E., Brambilla-Campart, G., Ghia, M., Martelli, A., and Brambilla, G. (1994). Cinnamaldehyde-induced micronuclei in rodent liver. Mutation Research 322: 1-8.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Cinnamaldehyde induced micronuclei in rodent liver was investigated.
Test Type	Micronuclei Assay
GLP	NG
Year	1994
Species/Strain	Male Albino Swiss mice
Sex	Male
Route of administration	Oral
Doses/concentrations	850, 1200 or 2550 mg/kg
Exposure period	Single oral dose
Remarks for Test Condition	Animals were subjected to a 2/3 hepatectomy 20 hrs before dosing in order to determine the clastogenic effect on hepatocytes and were killed 48 hrs after cinnamaldehyde administration. The frequency of micronucleated polychromatic erythrocytes was evaluated in marrow, hepatocytes and gastric mucosa.
Genotoxic effects	Not genotoxic
Remarks for Results	No increase in the frequency of MNPCE in bone marrow 48 hrs after administration of cinnamaldehyde; it induced a dose-dependent clastogenic effect in the liver.

Conclusion Remarks	High doses of cinnamaldehyde may produce a clastogenic.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Mereto, E., Brambilla-Campart, G., Ghia, M., Martelli, A., and Brambilla, G. (1994). Cinnamaldehyde-induced micronuclei in rodent liver. Mutation Research 322: 1-8.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Solt-Farber Assay System
Test Type	Solt-Farber Assay System
GLP	NG
Year	1994
Species/Strain	Male Sprague-Dawley rat
Sex	Male
Route of administration	Gavage
Doses/concentrations	500 mg/kg
Remarks for Test Condition	Three groups of rats were initiated with NDEA (200 mg/kg ip). Two weeks later, Group 1: received 14 successive day of cinnamaldehyde; Group 2: rats were fed diet containing 0.02% 2 AAF (+ve control); Group 3: no treatment (-ve control). On day 7, all rats were hepatectomized. On day 28 all rats were killed and liver removed.
Genotoxic effects	Not genotoxic
Remarks for Results	Rats initiated with NDEA, administration of cinnamaldehyde for 14 days produce significant increase in average diameter & area of gamma-glutamyltraspeptidase positive foci that might be considered as indication of a potential promoting activity.
Conclusion Remarks	The high doses of cinnamaldehyde may possibly a produce promoting effect in the liver of previously initiated animals.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Mereto, E., Brambilla-Campart, G., Ghia, M., Martelli, A., and Brambilla, G. (1994). Cinnamaldehyde-induced micronuclei in rodent liver. Mutation Research 322: 1-8.
Substance Name	Cinnamaldehyde
CAS No.	104-55-2

Method/guideline	DNA-Repair assay was carried out to examine the ability of the test chemical to induce unscheduled DNA synthesis (UDS) or S-phase-synthesis (SPS) in Fischer-344 rats. Animals were administered the test chemical by oral gavage as a single bolus
Test Type	DNA repair assay
GLP	NG
Year	1989
Species/Strain	Fischer-344 rats
Sex	Male
Route of administration	Oral
Doses/concentrations	UDS: - 50, 200, or 1000 mg/kg.
Remarks for Test Condition	Doses were selected based approximately on the oral LD50 value and was selected as 80%, 40% and 10% of the LD50. Two doses were selected for SPS studies and three doses were utilized for UDS studies. SPS was examined at 48 hr post treatment.
Remarks for Results	Cinnamaldehyde failed to induced UDS or SPS in rats at the doses tested.
Conclusion Remarks	Cinnamaldehyde failed to induce the UDS or SPS in rats.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Mirsalis, J.C., Tyson, C.K., Steinmetz, K. L., Loh, E.K., Hamilton, C.M., Bakke, J.P. and Spalding, J.W. (1989). Measurement of Unscheduled DNA Synthesis and S-Phase Synthesis in Rodent Hepatocytes Following In Vivo Treatment: Testing of 24 Compounds. Environmental and Molecular Mutagenesis 14: 155-164.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	DNA
Test Type	DNA repair assay
GLP	NG
Year	1989
Species/Strain	B6C3F1 mice
Sex	Male and Female
Route of administration	Oral

Doses/concentrations	UDS: 50, 200, or 1000 mg/kg.
Remarks for Test Condition	Doses selected based approximately on the oral LD50 value and selected as 80%, 40% and 10% of the LD50. Two doses were selected for SPS studies and three doses were utilized for UDS studies. SPS was examined at 48 hr post treatment.
Genotoxic effects	Not genotoxic
Remarks for Results	Cinnamaldehyde failed to induce UDS or SPS in mice at the doses tested.
Conclusion Remarks	Cinnamaldehyde failed to induce the UDS or SPS in mice.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Mirsalis, J.C., Tyson, C.K., Steinmetz, K. L., Loh, E.K., Hamilton, C.M., Bakke, J.P. and Spalding, J.W. (1989). Measurement of Unscheduled DNA Synthesis and S-Phase Synthesis in Rodent Hepatocytes Following In Vivo Treatment: Testing of 24 Compounds. Environmental and Molecular Mutagenesis 14: 155-164.

Substance Name	<i>p</i> -tert-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Micronucleus test
Test Type	Micronucleus test
GLP	NG
Year	2000
Species/Strain	ICR mice
Sex	Male and Female
Route of administration	Intraperitoneal
Doses/concentrations	150, 300, or 600 mg/kg
Exposure period	Single intraperitoneal dose
Remarks for Test Condition	Mice received one of the 3 different doses of the test material by IP and were killed after a time intervals of 48 or 72 hr following injection. Femoral marrow cells were smeared, fixed and stained with May-Gruenwald-Giemsa. 2000 polychromatic erythrocytes were scored and the number of micronucleated polychromatic erythrocytes were recorded.
Genotoxic effects	A slight increase (9/1000), males at 600mg/kg
NOEL (C)/LOEL (C)	300 mg/kg
Remarks for Results	The authors noted the response was not biologically significant since only one animal in the 600 mg/kg level had 3MNPC

Conclusion Remarks	which is within the historical control range (0-7 MN/2000 PCE/animal. No significant increase and no dose-related increase was observed in any other group regardless of dose, sex, or collection time. No evidence of genotoxicity
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
References	Gudi R. and Krsmanovic L. (2000) Mammalian erythrocyte micronucleus test of <i>para</i> -tert-butyl- <i>alpha</i> -methylhydrocinnamic aldehyde. Unpublished report.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	BASC test on Drosophila was performed as reported in Eckhardt, King, Gocke and Wild, 1980.
Test Type	BASC test
GLP	NG
Year	19983
Species/Strain	Insect, Drosophila melanogaster
Sex	Male and Female
Route of administration	Oral
Doses/concentrations	10 mM
Remarks for Test Condition	The test substance to be fed to the flies was prepared in 5% saccharose, with addition of 2% ethanol and 2% Tween 80. Ethyl nitrite was administered to Drosophila males in gaseous form. To do this flies were kept for 3 days in 1-liter bottle containing small amount of medium, and ethyl nitrite was injected into the tightly closed bottles.
Genotoxic effects	None
NOEL (C)/LOEL (C)	10 mM
Remarks for Results	No mutagenic activity was demonstrated under the test conditions
Conclusion Remarks	No mutagenic activity was demonstrated under the test conditions
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
General Remarks	A significant increase in sex-linked recessive lethal mutations in single test but repeated tests did not confirm the mutagenic activity. This anomaly was ascribed to chance.

References

Wild D., King, M.T., Gocke, E. and Eckhardt, K. (1983). Study of Artificial Flavouring Substances for Mutagenicity in the Salmonella/Microsome, BASC and Micronucleus Tests. *Fd. Chem. Toxic.* 21(6): 707-719.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	Micronucleus test. NMRI mice were treated once with the test material. The mice were killed and bone-marrow smear was prepared 30 hours after the treatment. The smears were stained according to the Schmid method & slides were scored.
Test Type	Micronucleus test
GLP	NG
Year	1983
Species/Strain	NMRI mice
Sex	Male and Female
Route of administration	Not given
Doses/concentrations	0, 405, 809, 1213 mg/kg
Effect on mitotic index or PCE/NCE ration by dose level and sex	Dose: 0 mg/kg = 2.7 mean MNPE/1000PE; 405mg/kg=1.3 mean MNPE/1000 PE; 809 mg/kg=3.0 MNPE/1000 PE; 1213 mg/kg=1.5 MNPE/1000 PE PE = Polychromatic erythrocytes; MNPE = Micronucleated Polychromatic Erythrocytes.
Genotoxic effects	None
NOEL (C)/LOEL (C)	1213 mg/kg
Remarks for Results	No mutagenic activity was detected under the test conditions.
Conclusion Remarks	No mutagenic activity was detected under the test conditions.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Wild D., King, M.T., Gocke, E. and Eckhardt, K. (1983). Study of Artificial Flavouring Substances for Mutagenicity in the Salmonella/Microsome, BASC and Micronucleus Tests. <i>Fd. Chem. Toxic.</i> 21(6): 707-719.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0

Method/guideline	BASC test on Drosophila was performed as reported in Eckhardt, King, Gocke and Wild, 1980.
Test Type	BASC test
GLP	NG
Year	19983
Species/Strain	Insect, Drosophila melanogaster
Sex	Male and Female
Route of administration	Oral
Doses/concentrations	10 mM
Remarks for Test Condition	The test substance to be fed to the flies was prepared in 5% saccharose, with addition of 2% ethanol and 2% Tween 80. Ethyl nitrite was administered to Drosophila males in gaseous form. To do this flies were kept for 3 days in 1-liter bottle containing small amount of medium, and ethyl nitrite was injected into the tightly closed bottles.
Genotoxic effects	None
NOEL (C)/LOEL (C)	10 mM
Remarks for Results	No mutagenic activity was demonstrated under the test conditions. No of sex-linked lethals/chromosomes tested; Control: Brood I, 42/18.188; Brood II, 34/17.734; Brood III, 50/16.980 Test Material; Brood I, 10/2426; Brood II, 2/2418; Brood III, 6/2405.
Conclusion Remarks	No mutagenic activity was demonstrated under the test conditions
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
General Remarks	A significant increase in sex-linked recessive lethal mutations in single test but repeated tests did not confirm the mutagenic activity. This anomaly was ascribed to chance.
References	Wild D., King, M.T., Gocke, E. and Eckhardt, K. (1983). Study of Artificial Flavouring Substances for Mutagenicity in the Salmonella/Microsome, BASC and Micronucleus Tests. <i>Fd. Chem. Toxic.</i> 21(6): 707-719.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Micronucleus test. NMRI mice were treated once with the test material. The mice were killed and bone-marrow smear was prepared 30 hours after the treatment. The smears were stained according to the Schmid method & slides were scored.
Test Type	Micronucleus test

GLP	NG
Year	1983
Species/Strain	NMRI mice
Sex	Male and Female
Route of administration	Not given
Doses/concentrations	0, 324, 540, 756 mg/kg
Effect on mitotic index or PCE/NCE ration by dose level and sex	Dose: 0 mg/kg = 1.0 mean MNPE/1000PE; 324mg/kg=2.1 mean MNPE/1000 PE; 540 mg/kg=1.8 MNPE/1000 PE; 756 mg/kg=2.4 MNPE/1000 PE PE = Polychromatic erythrocytes; MNPE = Micronucleated Polychromatic Erythrocytes.
Genotoxic effects	None
NOEL (C)/LOEL (C)	756 mg/kg
Remarks for Results	No mutagenic activity was detected under the test conditions.
Conclusion Remarks	No mutagenic activity was detected under the test conditions.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Wild D., King, M.T., Gocke, E. and Eckhardt, K. (1983). Study of Artificial Flavouring Substances for Mutagenicity in the Salmonella/Microsome, BASC and Micronucleus Tests. <i>Fd. Chem. Toxic.</i> 21(6): 707-719.

Substance Name	Cinnamaldehyde
CAS No.	1104-55-2
Method/guideline	Micronucleus test. 6C3F1 male and female mice (10/group/sex) were maintained on diet with the test material for three months. Blood samples were taken and smears prepared. Frequency of micronuclei per 1000 polychromatic erythrocytes and 2000 normochromatic erythrocytes were measured in up to 5 animals per group.
Test Type	Micronucleus test
GLP	NG
Year	2003
Species/Strain	B6C3F1 mice
Sex	Male and Female
Route of administration	Dietary

Doses/concentrations	0, 4100, 8200, 16,500, and 33,000 ppm microencapsulated in the diet
Effect on mitotic index or PCE/NCE ration by dose level and sex	<p>Males</p> <p>Dose: 0 ppm = 2.1 mean MNPE/1000PE; 4100 ppm = 1.9 mean MNPE/1000 PE; 8200 ppm = 1.9 MNPE/1000 PE; 16,500 ppm = 2.0 MNPE/1000 PE 33,00 ppm = 1.7 MNPE/1000 PE</p> <p>Feales</p> <p>Dose: 0 ppm = 1.9 mean MNPE/1000PE; 4100 ppm = 1.5 mean MNPE/1000 PE; 8200 ppm = 1.8 MNPE/1000 PE; 16,500 ppm = 1.9 MNPE/1000 PE 33,00 ppm = 1.4 MNPE/1000 PE</p>
Genotoxic effects	<p>PE = Polychromatic erythrocytes; MNPE = Micronucleated Polychromatic Erythrocytes. None</p>
NOEL	33,000ppm
Remarks for Results	No mutagenic activity was detected under the test conditions.
Conclusion Remarks	No mutagenic activity was detected under the test conditions.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	NTP (2003) National Toxicology Program. Toxicology and carcinogenesis studies of trans-cinnamaldehyde (microencapsulated) (CAS No. 14371-10-9) in F344/N rats and B6C3F1 Mice. (Feed studies) Technical Report Series 5014 NIH Publication No. 02-4448. U.S. Department of Health and Human Services

4.4 Repeat Dose Toxicity

Substance Name	Cinnamaldehyde
CAS	104-55-2
Remarks for Substance	Assay: >95%
Method/guideline	National Toxicology Program 2-yr Bioassay
Year	2003
Species/Strain	Rat/F344/N
Sex	Male and Female
Route of administration	Oral-dietary (microencapsulated)

Doses/concentration levels	1,000, 2,100, or 4,100 ppm cinnamaldehyde microencapsulated for 104 to 105 weeks
Exposure period	104 - 105 weeks
Frequency of treatment	Continuous
Control Group	Basal diet containing placebo microcapsules
Remarks for test conditions	A carcinogenicity study was conducted in which groups of 50 F344/N rats of each sex were maintained on diets containing 0 (untreated control), 0 (vehicle control containing placebo microcapsules), 1,000, 2,100, or 4,100 ppm cinnamaldehyde microencapsulated for 104 to 105 weeks. The dietary concentrations were calculated to provide an average daily intake of 50, 100, or 200 mg/kg bw per day. Feed analysis for concentrations are as specified in the study with mice (see below). Female rats were housed five per cage, while male rats were housed two or three per cage. Feed and water were provided ad libitum. Clinical findings were performed twice daily and body weights were monitored on days 0 (body weights only), 8, and 36 and then every four weeks until the end of the study. Seven (7)-day feed consumption was measured every 4 weeks during the study. Gross and histopathological examinations were performed on all animals at termination of the study.
NOAEL(NOEL)	4100 ppm
Toxic response/effects by dose level	Mean body weights of high-dose females and males (4,100 ppm) were less than those of the vehicle control after weeks 25 and 49, respectively. Feed consumption in the 2100 and 4100 ppm group of males and 4100 ppm female group was less than that of the respective control group. Survival of all treated groups of male rats was greater than that for the vehicle control group. No neoplastic or non-neoplastic lesions were observed that could be associated with the administration of diets containing 1,000, 2,100, or 4,100 ppm of cinnamaldehyde.
Statistical evaluations	Yes
Remarks for results	Based on the above observations, the NTP concluded "under the conditions of these 2-year feed studies there was no evidence of carcinogenic activity of cinnamaldehyde in male or female rats exposed to 1,000, 2,100, or 4,100 ppm.
Conclusion remarks	The results of the NTP study in both sexes of F344 rats and B6C3F1 mice indicate that under conditions of the 2-year feed studies, cinnamaldehyde shows no evidence of carcinogenic potential in rodents.
Data Qualities Reliabilities	Reliability Code 1. Reliable without restriction.
References	NTP (2003) National Toxicology Program. Toxicology and carcinogenesis studies of trans-cinnamaldehyde (microencapsulated) (CAS No. 14371-10-9) in F344/N rats and B6C3F1 Mice. (Feed studies) Technical Report Series 5014NIH

Publication No. 02-4448. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health.

Substance Name	Cinnamaldehyde
CAS	104-55-2
Remarks for Substance	Assay: >95%
Method/guideline	National Toxicology Program 2-yr Bioassay
Year	2003
Species/Strain	Mouse/B6C3F1
Sex	Male and Female
Route of administration	Oral-dietary (microencapsulated)
Doses/concentration levels	1,000, 2,100, or 4,100 ppm cinnamaldehyde microencapsulated for 104 to 105 weeks
Exposure period	104 - 105 weeks
Frequency of treatment	Continuous
Control Group	Basal diet containing placebo microcapsules
Remarks for test conditions	<p>A carcinogenicity study was conducted in which groups of 50 B6C3F1 mice of each sex were maintained on diets containing 0 (untreated control), 0 (vehicle control containing placebo microcapsules), 1,000, 2,100, or 4,100 ppm cinnamaldehyde microencapsulated for 104 to 105 weeks. The dietary concentrations were calculated to provide an average daily intake of 125, 270, or 550 mg/kg bw per day. Feed analysis for concentrations are as specified in the study with rats. Female mice were housed five per cage, while male mice were housed singly per cage. Feed and water were provided ad libitum. Clinical findings were performed twice daily and body weights were monitored on days 0 (body weights only), 8, and 36 and then every four weeks until the end of the study. Seven (7)-day feed consumption was measured every 4 weeks during the study. Gross and histopathological examinations were performed on all animals at termination of the study.</p>
NOAEL(NOEL)	4100 ppm
Toxic response/effects by dose level	<p>Mean body weights of high-dose females and males (4,100 ppm) were less than those of the vehicle control after weeks 25 and 49, respectively. Feed consumption in the 2100 and 4100 ppm group of males and 4100 ppm female group was less than that of the respective control group. Survival of the 2100 ppm group of males was less than that of the control group. No neoplastic or non-neoplastic lesions were observed that could be associated with the administration of diets containing 1,000, 2,100, or 4,100 ppm of cinnamaldehyde.</p>

Statistical evaluations	Yes
Remarks for results	Based on the above observations, the NTP concluded "under the conditions of these 2-year feed studies there was no evidence of carcinogenic activity of cinnamaldehyde in male or female mice exposed to 1,000, 2,100, or 4,100 ppm.
Conclusion remarks	The results of the NTP study in both sexes of F344 rats and B6C3F1 mice indicate that under conditions of the 2-year feed studies, cinnamaldehyde shows no evidence of carcinogenic potential in rodents.
Data Qualities Reliabilities	Reliability Code 1. Reliable without restriction.
References	NTP (2003) National Toxicology Program. Toxicology and carcinogenesis studies of trans-cinnamaldehyde (microencapsulated) (CAS No. 14371-10-9) in F344/N rats and B6C3F1 Mice. (Feed studies) Technical Report Series 5014 NIH Publication No. 02-4448. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Test Material was administered orally for 13 weeks to 3 groups of 6 beagle dogs by means of gelatin capsules. Six dogs were kept as controls and received the empty gelatin capsules.
GLP	Yes
Year	1990
Species/Strain	Beagle dogs
Sex	Male and Female
Route of administration	Oral
Doses/concentration	4.4, 22.3 or 44.6 mg/kg
Exposure	91 days
Frequency of treatment	Daily
Control Group and treatment	Yes
Post exposure observation period	NG
NOAEL (NOEL)	44.6 mg/kg
LOAEL (LOEL)	No adverse effects at highest dose

Actual dose received by dose level and sex	NG
Toxic response/effects by dose level	None
Statistical evaluations	DUNN test
Remarks for Results	No adverse effect with respect to the general state of health, the body weight development, the behavior of the dogs, hematological & clinical chemical parameters & ophthalmoscopy, macroscopic, pathology & histological appearance of the organs and tissues examined were noted.
Conclusion Remarks	This study demonstrates a NOAEL in dogs of at least 44.6 mg/kg/day.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was conducted in accordance with GLP.
References	Givaudan Roure (1990b). A toxicity study following oral administration of <i>p</i> -t-butyl alpha-methylhydrocinnamic aldehyde in dogs during a period of 13 weeks. Unpublished Report to RIFM.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Test material was orally administered at 200 mg/kg/day to 3 female beagle dogs by means of gelatine capsules for a period of 91 days. Incompatibility reactions, body weights & the group feed intake were recorded.
GLP	NG
Year	1990
Species/Strain	Beagle dogs
Sex	Female
Route of administration	Oral
Doses/concentration	200 mg/kg/day
Exposure	13 weeks
Control Group and treatment	Yes
Post exposure observation period	NG
Remarks	Blood chemistry tests & an autopsy were performed. Blood parameters measured: Aspartate aminotransferase, cholinesterase, cholesterol, alkaline phosphatase, <i>gamma</i> -glutamyltransferase.
NOAEL (NOEL)	200 mg/kg
Actual dose received by dose level and sex	NA

Toxic response/effects by dose level	None
Statistical evaluations	NG
Remarks for Results	The administration of test material was asymptotically tolerated. The development of the body weights were unaffected by the intake of the test article. The feed intake was normal. No treatment related blood chemistry changes were seen; especially, no reduction of plasma cholinesterase occurred. There were significant findings at necropsy.
Conclusion Remarks	This study demonstrates a NOAEL in dogs of 200 mg/kg bw/day.
Data Qualities Reliabilities	Reliability code1. Reliable without restrictions.
References	Givaudan-Roure (1990f) A complementary oral toxicity study with <i>p</i> -t-butyl <i>alpha</i> -methylhydrocinnamic aldehyde on female dogs during a period of 13 weeks. Unpublished Report to RIFM

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methylidihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Test material was administered orally for 9 weeks to 2 beagle dogs by means of gelatine capsules. Six dogs were kept as controls and received the empty gelatine capsules.
GLP	NG
Year	1990
Species/Strain	Beagle dogs
Sex	Male
Route of administration	Oral
Doses/concentration	50 ul/kg bw/day for days 1-7, 100 ul/kg bw/day for days 8-14, 200 ul/kg bw/day for days 15-21, 400 ul/kg bw/day for days 22-50, 600 ul/kg bw/day for days 50-64.
Exposure	64 days
Frequency of treatment	Daily
Control Group and treatment	None
Post exposure observation period	None
Remarks for Test Conditions	Clinical signs and body weights were recorded daily and hematological examinations and clinical chemistry determinations were performed weekly. Histopathology of brain, spinal cord, sciatic nerve, ulnar nerve, liver, kidney, and testes were performed at week 9.
NOAEL (NOEL)	400 ul/kg/day
LOAEL (LOEL)	None
Actual dose received by dose level and sex	Dose of 400 ul/kg/day administered from days 22-50 of the study.

Toxic response/effects by dose level	None
Statistical evaluations	NG
Remarks for Results	One dog showed increased GPT from week 7 onward and increased GLDH from week 4 onward. Mild changes in the seminiferous epithelium of both dogs were not significantly different from that seen in untreated dogs.
Conclusion Remarks	Pilot study that did not establish evidence of testicular effects in dogs.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was conducted in accordance with GLP.
References	Givaudan Corporation (1990e) Pilot study on male dogs with <i>p</i> -t-butyl-alpha-methylhydrocinnamic aldehyde following oral administration (increasing dosage) during 9 weeks. Unpublished report to RIFM.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Weanling Osborn-Mendel rats were fed diet containing 1000, 2500, or 10,000 ppm of the test substance for 16 weeks.
GLP	Pre GLP
Year	1967
Species/Strain	Osborne-Mendel rats
Sex	Male and Female
Doses/concentration	1000, 2500 and 10,000 ppm
Exposure	16 weeks
Frequency of treatment	Daily in the diet
Control Group and treatment	Diet containing corn oil
Post exposure observation period	NG
NOAEL (NOEL)	2500 ppm
Actual dose received by dose level and sex	NA
Statistical evaluations	NG
Remarks for Results	No effects were seen at 1000 or 2500 ppm. At 10,000 ppm, slight hepatic cell swelling and slight hyperkeratosis of squamous portion of stomach was noted.
Conclusion Remarks	NOAEL for cinnamaldehyde was shown to be 2500 ppm in rat by oral route.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.

Remarks for Data Reliability	This study was published in a peer-reviewed journal.
References	Hagan, E.C., Hansen, W.H., Fitzhugh, O.G., Jenner, P.M., Jones, W.I., Taylor, J.M., Long, E.L., Nelson, A.A., and Brouwer, J.B. (1967). Food Flavourings and Compounds of Related Structure. II. Subacute and Chronic Toxicity. <i>Fd. Cosmet. Toxicol.</i> 5: 141-157.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	10 rats were fed a diet containing cinnamaldehyde (est. daily intake 50, 100 & 200 mg/kg) for 12 wks. Physical appearance, behavior and efficiency of food utilization were calculated.
GLP	Pre GLP
Year	1958
Species/Strain	Rats
Sex	Male and Female
Route of administration	In diet
Doses/concentration	Estimated daily intake: 50, 100 or 200 mg/kg
Exposure	12 weeks
Frequency of treatment	Daily
Control Group and treatment	Yes
Post exposure observation period	NG
Remarks	After 12 days of treatment, urine of 3 male and 3 female rats were examined for sugar and albumin and blood hemoglobin levels were also determined.
NOAEL (NOEL)	200 mg/kg
Actual dose received by dose level and sex	NA
Toxic response/effects by dose level	None
Statistical evaluations	NG
Remarks for Results	No statistically significantly differences were observed between treated and control groups. No adverse effects were observed on growth, food intake, efficiency of food utilization or other physiological criteria.
Conclusion Remarks	NOAEL was determined to be 200 mg/kg.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
General Remarks	This is a follow-up study for Trubek Laboratories 1958a.

References

Trubek Laboratories (1958b). Toxicological Examination of Cinnamic Aldehyde (Class IV, Part 2).

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Rats were fed test ration containing Cinnamic aldehyde (897ppm), methyl cinnamate (25ppm), ethyl cinnamate (25ppm), cinnamyl cinnamate (25ppm) and <i>alpha</i> methyl cinnamic aldehyde (25ppm) for 12 weeks. Autopsies were performed on all rats.
GLP	Pre GLP
Year	1958
Species/Strain	Rat
Sex	Male and Female
Route of administration	Diet
Doses/concentration	Cinnamic aldehyde (897ppm), methyl cinnamate (25ppm), ethyl cinnamate (25ppm), cinnamyl cinnamate (25ppm) and <i>alpha</i> methyl cinnamic aldehyde (25ppm)
Exposure	12 weeks
Frequency of treatment	Continuously in diet
Control Group and treatment	Yes
Post exposure observation period	NG
Remarks	After 12 weeks of treatment, urine from 3 males and 3 females were examined for presence of sugar and albumin and blood hemoglobin levels. Autopsies were performed on all rats. Body weights and organ weight were recorded.
Actual dose received by dose level and sex	NG
Toxic response/effects by dose level	Growth of male rats was retarded but not statistically significant at $p=0.05$. Food intake was not adversely affected. Food intake was not adversely affected. Efficiency of food utilization for both sexes was significantly depressed (male $p=0.01$ & female $p=0.05$). Urine was free of sugar and albumin. Blood hemoglobin was normal.
Statistical evaluations	NG
Conclusion Remarks	The cinnamate mixture was shown to depress the efficiency of food utilization in both sexes.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
General Remarks	See Trubek 1958b for a follow-up study.
References	Trubek (1958a). Toxicological Screening of Components of Food Flavors. Class IV. Cinnamates

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Test material was applied percutaneously to the shaved dorsa of 10 male Sprague-Dawley rats at dose levels of 0.125, 0.25, 0.50 & 1.00 g/kg/day for 90 consecutive days,
GLP	GLP
Year	1980
Species/Strain	Sprague-Dawley rats
Sex	Male and Female
Route of administration	Percutaneous
Doses/concentration	0.125, 0.25, 0.50 & 1.00 g/kg/day
Exposure	90 days
Frequency of treatment	Daily
Control Group and treatment	Yes
Remarks	Parameter monitored: Body wt., Food consumption, Hematology, Ophthalmological examination, Blood chemistry (BUN), serum glutamic pyruvic transaminase, serum glutamic oxalacetic transaminase, total bilirubin, fasting serum glucose, serum alkaline phosphatase), urinalysis, Gross Pathology, Histopathology.
LOAEL (LOEL)	0.125 g/kg/day
Toxic response/effects by dose level	Dose-dependent dermal irritation characterized by erythema, cracking, dryness & sloughing; 5 male & 3 female from 1.0 g/kg died before 90 days; increased food consumption in females @ 0.25, 0.50, & 1.00 g/kg; inconsistent changes in hemoglobin, hematocrit, erythrocyte count, SGOT & SGPT; consistent elevation in white blood cell and the segmented neutrophil counts @ 0.50 & 1.00 g/kg; reduced lymphocyte count in males @ 1.00 g/kg; elevated white blood cell count in females @ 0.25-1.00 g/kg; reduced serum glucose & increased BUN & SAP in all rats; dose-dependent irritation of the GI-tract and the treated skin; increased liver & kidney wt in female @ 0.25-1.00 g/kg; at 1.00 g/kg: hepatic hydropic vacuolization & single cell degeneration, splenic lymphoid depletion & fibrosis, focal gastric ulceration & chronic necrotizing dermatitis with acanthosis, hyperkeratosis & sebaceous gland hyperplasia; dose-dependent increases in the myeloid-erythroid & decreases of the cell-fat ratios.
Conclusion Remarks	Percutaneous administration of Hexyl Cinnamic Aldehyde for 90 days produced multisystemic toxicity in the rats.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was conducted in accordance with GLP.
References	Lough, R., Owston, E., Klein, G., Qureshi, S., and Bier, C.

(1980). A subacute (90 Day) Percutaneous Toxicity Study of Hexyl Cinnamic Aldehyde in the Albino Rat. Unpublished. Bio-Research Lab. Report to RIFM.

Substance Name	Cinnamalydehyde
CAS No.	104-55-2
Method/guideline	Subchronic study. 10 mg of test substance was given every other day in normal or low protein diet (9% casein). Duration not given.
GLP	No
Year	1965
Species/Strain	Not reported
Sex	Not reported
Route of administration	Diet
Doses/concentration	10 or 50 mg every other day
Exposure	Not reported
Frequency of treatment	Every other day
Control Group and treatment	Not reported
Post exposure observation period	NG
Remarks	Article in Romanian. No details given in the English Abstract.
LOAEL (LOEL)	10 mg
Actual dose received by dose level and sex	NG
Toxic response/effects by dose level	The activity of liver aldolase showed significant increase and the activity of succindehydrogenase showed a tendency to decrease.
Statistical evaluations	NG
Remarks for Results	No effect on weight gain, food ingestion and protein efficiency. No effect on the liver weight and ascorbic acid content and the aspartic glutamic transaminase activity
Conclusion Remarks	Administration of test substance (10 mg) resulted in increased activity of liver aldolase and the activity of succindehydrogenase showed a tendency to decrease.
Data Qualities Reliabilities	Reliability code. 3. Data not reliable.
Remarks for Data Reliability	Article in Romanian. No details given in the English Abstract.
References	Sporn A. (1965). Investigation of the Toxicity of Cynamic Aldehyde. Igiena 14(6): 339-346.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methylidihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Two male rhesus monkeys (Macaca Mulatta) were orally administered with 100 mg/kg/day of test substance suspended in fluid-baby food for 5 consecutive days.
GLP	NG
Year	1990
Species/Strain	Rhesus monkey Macaca Mulatta
Sex	Male
Route of administration	Oral in food
Doses/concentration	100 mg/kg/day for 5 consecutive days.
Exposure	5 days
Frequency of treatment	Daily
Remarks	At the end of the study, the Rhesus monkey were anesthetized and perfused with glutaraldehyde. Testes and epididymies were microscopically examined.
NOAEL (NOEL)	100 mg/kg
Toxic response/effects by dose level	None
Remarks for Results	No changes in body weight or testes were noted.
Conclusion Remarks	No toxic effects were observed in monkeys treated with 100 mg/kg for 5 days.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Givaudan Roure (1990g). A 5-day oral toxicity study with <i>p</i> -t-butyl- <i>alpha</i> -methylhydrocinnamic aldehyde in male rhesus monkeys. Unpublished, Report to RIFM.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methylidihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	The test material was dermally administered to male albino rats at dose levels of 250, 500, 1000 & 2000 mg/kg/day for 5 days.
GLP	NG
Year	1991
Species/Strain	Albino rats
Sex	Male
Route of administration	Dermal

Doses/concentration	250, 500, 1000 and 2000 mg/kg/day for 5 days.
Exposure	5 days
Frequency of treatment	Daily
Remarks	The mortalities, adverse symptoms & lower body weights were recorded. At termination, all rats were euthanized and subjected to a full necropsy. Testes and epididymides were microscopically examined.
NOAEL (NOEL)	1000 mg/kg/day
LOAEL (LOEL)	2000 mg/kg/day
Toxic response/effects by dose level	No chemical related mortalities, Initial disturbance of body weight at 2000 mg/kg. No compound related gross lesions; Atrophy in the testes at 2000 mg/kg/day.
Conclusion Remarks	Treatment of rat with 2000 mg/g/day for 5 days dermally resulted in disturbance in body weight and atrophy in the testes.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Givaudan Roure (1991). A 5-day toxicity study with <i>p</i> -t-butyl- α -methyl-hydrocinnamic aldehyde on male rats: dermal administration compared to oral administration. Unpublished. Report to RIFM.

Substance Name	<i>p</i> -t-Butyl- α -methyl-dihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	The test material was orally administered to male albino rats at dose levels of 25, 50 and 100 mg/kg/day for 5 days.
GLP	NG
Year	1991
Sex	Male
Route of administration	Oral
Doses/concentration	25, 50 and 100 mg/kg/day for 5 days.
Exposure	5 days
Frequency of treatment	Daily
Remarks	The mortalities, general symptoms & body weights were recorded. At termination, all rats were euthanized and subjected to a full necropsy. Testes and epididymides were microscopically examined.
NOAEL (NOEL)	25 mg/kg/day
LOAEL (LOEL)	50 mg/kg/day
Toxic response/effects by dose level	No chemical related mortalities, Initial disturbance of body weight at 50 and 100 mg/kg. No compound related gross lesions; Atrophy in the testes at 50 and 100 mg/kg/day.

Conclusion Remarks	Treatment of rat with 50 or 100 mg/g/day for 5 days orally resulted in disturbance in body weight and atrophy in the testes,
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Givaudan Roure (1991). A 5-day toxicity study with <i>p</i> -t-butyl-alpha-methy-hydrocinnamic aldehyde on male rats: dermal administration compared to oral administration. Unpublished. Report to RIFM.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde (at least 97% pure), pale yellow liquid with a floral odor.
CAS No.	122-40-7
Method/guideline	15 Male & 15 female rats were fed diet containing the test substance for 14 weeks at dietary levels of 0, 80, 400 or 4000 ppm. Rats were killed by exanguination under barbiturate anesthesia. Parameters monitored were: body wt, hemoglobin content see below.
GLP	NG
Year	1973
Species/Strain	Rats CFE strain
Sex	Male and Female
Route of administration	Oral
Doses/concentration	0, 80, 400 or 4000 ppm
Exposure	14 weeks
Frequency of treatment	Continuous
Control Group and treatment	Diet without the test material
Remarks	Parameters measured: packed cell volume, counts of erythrocytes, total leucocytes & individual types of leucocytes, serum, urea, glucose, total protein, albumin, activation of glutamic oxaloacetate & glutamic-pyruvic transaminase & lactic dehydrogenase, urinalysis for the final week of treatment. Each animal was given an autopsy.
NOAEL (NOEL)	400 ppm
LOAEL (LOEL)	4000 ppm
Actual dose received by dose level and sex	Male: 6.1, 29.9 or 287.3 mg/kg/day; female: 6.7, 34.9 or 320.3 mg/kg/day
Toxic response/effects by dose level	Increase in the relative liver & kidney weights of the rats fed diet containing 4000 ppm of the test substance for 14 weeks. These were not associated with any histopathological changes.
Remarks for Results	No differences over controls were seen in the rate of body wt gain, the consumption of food & water, hematological measurements, serum analyses, urinary cell excretion or renal concentration tests.
Conclusion Remarks	NOAEL for the test material was shown to be 400 ppm.

Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Carpanini, F.M.B., Gaunt, I.F., Wright, M.G., Grasso, P. and Gangolli, S.D. (1973), Short-Term Toxicity of Amyl Cinnamic Aldehyde in Rats. <i>Fd. Cosmet. Toxicol.</i> 11: 725-734.

Substance Name	Cinnamaldehyde (98% pure)
CAS No.	104-55-2
Method/guideline	Rats were administered the test substance by gavage for 2 wks.
GLP	NG
Year	1994
Species/Strain	F344/N rats
Sex	Male and Female
Route of administration	Gavage
Doses/concentration	0, 235, 470, 940, 1880 & 3750 mg/kg/day for 14 days
Exposure	14 days
Frequency of treatment	Daily
Control Group and treatment	Corn oil gavage
Remarks	A complete autopsy was performed on all animals that died, and at the termination of the study on all treated and control animals. Body wt and the organ wt. of the liver, right kidney and the spleen were determined.
NOAEL (NOEL)	235 mg/kg/day
LOAEL (LOEL)	470 mg/kg/day
Toxic response/effects by dose level	All rats dosed at 1880 & 3750 mg/kg/day died or were killed when moribund during the first 7 days of dosing. Microscopic lesions included a minimal to moderate forestomach hyperplasia in males at doses of 470 mg/kg/day and higher.
Statistical evaluations	ANOVA
Remarks for Results	There were no consistent differences in organ wt or organ wt: body wt ratios between surviving treated or controls. Clinical signs and gross lesions were absent in surviving rats.
Conclusion Remarks	Test substance at dose 470 mg/kg/day and above produces forestomach hyperplasia and was lethal at dose of 1880 and above.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.

References

Herbert, C. D., Yuan, J. and Dieter, M.P. (1994). Comparison of the Toxicity of Cinnamaldehyde When Administered by Microencapsulation in Feed or by Corn Oil Gavage. Food and Chemical Toxicology 32(12): 1107-1115.

Substance Name	Cinnamaldehyde (98% pure)
CAS No.	104-55-2
Method/guideline	Mice were administered the test substance by gavage for 3 weeks.
GLP	NG
Year	1994
Species/Strain	B6C3F1 mice
Sex	Male and Female
Route of administration	Gavage
Doses/concentration	656, 1310, 2620, 5250 & 10500 mg/kg/day
Exposure	21 days
Frequency of treatment	Daily
Control Group and treatment	Corn-oil gavage
Remarks	A complete autopsy was performed on all animals that died, and at the termination of the study on all treated and control animals. Body wt and the organ wt. of the liver, right kidney and the spleen were determined.
NOAEL (NOEL)	656 mg/kg/day
LOAEL (LOEL)	1310 mg/kg/day
Toxic response/effects by dose level	All mice gavaged at doses of 5250 and 10,500 mg/kg/day, as well as all female mice and three male mice dosed with 2620 mg/kg/day died within first 2 days. No clinical signs, or gross or microscopic lesions were visible in these mice. The only microscopic lesions observed in surviving mice were a minimal to mild forestomach hyperplasia & a minimal kidney nephropathy at doses of 1310 mg/kg/day and higher.
Statistical evaluations	ANOVA
Conclusion Remarks	Test substance at doses 1310 mg/kg/day and above produce forestomach hyperplasia and was lethal at dose of 5250 and above.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Herbert, C. D., Yuan, J. and Dieter, M.P. (1994). Comparison of the Toxicity of Cinnamaldehyde When Administered by Microencapsulation in Feed or by Corn Oil Gavage. Food and Chemical Toxicology 32(12): 1107-1115.

Substance Name	Cinnamaldehyde (98% pure)
CAS No.	104-55-2
Method/guideline	A group of rats were fed a diet containing 0, 0.625, 1.25, 2.5, 5.0 or 10% Cinnamaldehyde microcapsules for 14 days.
GLP	NG
Year	1994
Species/Strain	F344/N rats
Sex	Male and Female
Route of administration	Oral in diet
Doses/concentration	A group of rats were fed a diet containing 0, 0.625, 1.25, 2.5, 5.0 or 10% Cinnamaldehyde microcapsules for 14 days.
Exposure	14 days
Frequency of treatment	Continuous
Remarks	A complete autopsy was performed on all animals that died, and at the termination of the study on all treated and control animals. Body wt and the organ wt. of the liver, right kidney and the spleen were determined.
NOAEL (NOEL)	0.625%
LOAEL (LOEL)	1.25%
Toxic response/effects by dose level	Marked dose-related depression in body wt gain, slight decrease in spleen: body wt ratio for male rats in 10% group, dose dependent decrease in food consumption. Gross lesions in both sexes were limited to a reduction in the size of reproductive organs and secondary sex glands (seminal vesicles & prostates of males & ovaries & uteri of females). Hyperplasia of the forestomach
Statistical evaluations	ANOVA
Conclusion Remarks	Treatment of rat with microencapsulated cinnamaldehyde resulted in marked dose-dependent depression of body weight, hypoplastic changes in reproductive organs & accessory sex glands and hyperplasia of the forestomach mucosa.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Herbert, C. D., Yuan, J. and Dieter, M.P. (1994). Comparison of the Toxicity of Cinnamaldehyde When Administered by Microencapsulation in Feed or by Corn Oil Gavage. Food and Chemical Toxicology 32(12): 1107-1115.
Substance Name	Cinnamaldehyde (98% pure)

CAS No.	104-55-2
Method/guideline	A group of rats were fed a diet containing 0, 0.625, 1.25, 2.5, 5.0 or 10% Cinnamaldehyde microcapsules for 21 days.
GLP	NG
Year	1994
Species/Strain	B6C3F1 mice
Sex	Male and Female
Route of administration	Oral in feed
Doses/concentration	A group of mice were fed a diet containing 0, 0.625, 1.25, 2.5, 5.0 or 10% Cinnamaldehyde microcapsules for 21 days.
Exposure	21 days
Frequency of treatment	Continuous
Remarks	A complete autopsy was performed on all animals that died, and at the termination of the study on all treated and control animals. Body wt and the organ wt. of the liver, right kidney and the spleen were determined.
NOAEL (NOEL)	1.25%
LOAEL (LOEL)	2.5%
Toxic response/effects by dose level	Dose-related decrease in body wt, decrease in absolute liver and kidney wt., hyperplasia of the forestomach epithelium at highest dose (10%) characterized by a focal thickening of the stratified squamous epithelium, accompanied by hyperkeratosis.
Statistical evaluations	ANOVA
Conclusion Remarks	Treatment of mice with microencapsulated cinnamaldehyde resulted in dose-dependent depression of body weight and hyperplasia of the forestomach epithelium at highest dose (10%) characterized by a focal thickening of the stratified squamous epithelium, accompanied by hyperkeratosis.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Herbert, C. D., Yuan, J. and Dieter, M.P. (1994). Comparison of the Toxicity of Cinnamaldehyde When Administered by Microencapsulation in Feed or by Corn Oil Gavage. Food and Chemical Toxicology 32(12): 1107-1115.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	90-day subchronic dermal toxicity study.
GLP	NG

Year	1981
Species/Strain	Sprague-Dawley Rats
Sex	Male and Female
Route of administration	Dermal
Doses/concentration	25 mg/kg
Exposure	90 days
Frequency of treatment	Daily
Control Group and treatment	Phenyl ethyl alcohol
Remarks	5% of the test substance in phenyl ethyl alcohol at a dose of 25 mg/kg was applied topically to the clipped backs of Sprague-Dawley rats (5 male and 5 female). A control group of 5 male and 5 female rats received phenyl ethyl alcohol (1 ml/kg). Body wt, hematology, clinical chemistry & urinalysis parameters were evaluated. All animals were examined grossly & liver & kidneys were weighed. Microscopic examination of the skin, liver, kidney & spinal cord was conducted.
NOAEL (NOEL)	25 mg/kg
Toxic response/effects by dose level	None
Remarks for Results	One male rat died on day 14 with an evidence of a lung infection. The death was not considered to be related to treatment.
Conclusion Remarks	There was no evidence of toxicity induced by treatment with the test articles.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
References	Moreno (1981a). 90 Day subacute dermal toxicity in rats with hexyl cinnamic aldehyde, gamma-methyl ionone and phenyl ethyl alcohol. Report to RIFM. Unpublished.

Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methylhydrocinnamaldehyde (97.8% pure), liquid, colorless to pale yellowish.
CAS No.	80-54-6
Method/guideline	Subchronic toxicity study. Test substance was administered to albino rats by oral gavage. Six test groups consisting of 14 rats per sex were dosed at 2, 5, 25 & 50 mg/kg once daily, 5 days/wk for 13 weeks.
GLP	Yes
Year	1990
Species/Strain	Rats, outbred
Sex	Male and Female
Route of administration	Oral gavage

Doses/concentration	0, 2, 5, 25 & 50 mg/kg/day,
Exposure	90 days
Frequency of treatment	5 days per week for 13 weeks
Control Group and treatment	Rape oil 1 ml/kg
Post exposure observation period	4 weeks
Remarks	A satellite group was treated with 50 mg/kg and was observed during a post-treatment period of 4 weeks. Mortalities, general symptoms & body weights were recorded. Hematology & biochemistry determinations were performed. All rats were autopsied. Organs & tissues of the control rats & the rats treated w/50 mg/kg as well as liver of all rats, the testes & epididymides of all male rats & the adrenal glands of all female rats were microscopically examined.
NOAEL (NOEL)	5.0 mg/kg
LOAEL (LOEL)	25 mg/kg
Toxic response/effects by dose level	Treatment related histopathology findings were spermatoceles & testicular atrophy in male rats treated with 50 mg/kg
Statistical evaluations	Dunn-test, Jonck-heere-test, U-test
Remarks for Results	Deaths related to treatment did not occur throughout the test and follow-up period. Loss of hair was seen in female rats treated with 50 mg/kg. The body wt development of rats of all test groups took a normal course throughout the test and follow-up period. The treatment did not change hematological parameters. In male and female rats treated with 25 and 50 mg/kg, the plasma cholinesterase was reversibly decreased and the plasma cholesterol levels were lower than in control rats
Conclusion Remarks	Treatment with test material resulted in spermatoceles and testicular atrophy in male rats at the dose of 50 mg/kg. Also, a decrease in the plasma cholinesterase activity and plasma cholesterol was seen in rats treated with the test material at the dose of 25 mg/kg and above.
Data Qualities Reliabilities	Reliability code 1. Reliable without restrictions.
Remarks for Data Reliability	The study was conducted in accordance with EPA Guidelines, OECD Guidelines and Swiss Guidelines.
References	Givaudan-Roure (1990d) A supplementary study with <i>p</i> - <i>t</i> -butyl- α -methylhydrocinnamic aldehyde on rats for determining acetylcholinesterase and cholinesterase activity of blood plasma, erythrocytes, liver and brain tissue. Unpublished Report to RIFM.

Substance Name	<i>p</i> - <i>t</i> -Butyl- α -methyldihydrocinnamaldehyde
CAS No.	80-54-6
Method/guideline	Groups of 8 male rats were treated with 25, 50, 100, 200 & 400 mg/kg/day of the test substance orally for 5 consecutive days.

GLP	Likely
Year	1990
Species/Strain	Rats
Sex	Male
Route of administration	Oral (gavage)
Doses/concentration	0, 25, 50, 100, 200 & 400 mg/kg/day
Exposure	5 consecutive days
Frequency of treatment	Daily
Control Group and treatment	Yes
Remarks	This is a follow-up study on the previous study by the same group with similar results
Toxic response/effects by dose level	Disturbed the spermatogenesis and spermiogenesis @ 100 mg/kg & above, morphological alterations in the seminiferous epithelium preceded the formation of detectable spermatocytes.
Remarks for Results	No deaths reported, other observations reported: shaggy fur, hunched posture, hematuria, paresis of the forelegs, initial disturbance of weight development @ 50, 100 & 200 mg/kg/day which recovered on day 4; continued loss of body weight @ 400 mg/kg; At autopsy, delineation of hepatic lobules, small prostate and seminal vesicles, and reddened testes were seen. Testes weight was decreased in rats treated with 100 mg/kg and above, histological examination of the testes revealed injuries of seminiferous epithelium that means degeneration and loss of germ cells in rats treated with 50 mg/kg and above.
Conclusion Remarks	Administration of the test substance for 5 consecutive days resulted in disturbance of the spermatogenesis and spermiogenesis. The, morphological alterations in the seminiferous epithelium preceded the formation of detectable spermatocytes.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Two of the four control rats displayed a disturbance of spermiogenesis with desquamation of young spermatids. Also, authors states that rat seems to be much more prone to spermatocytes than e.g. the mouse, therefore the rat might be a bad model for detecting epididymal side effects of chemicals. Authors also claim that the rat was found to be only species to suffer from adverse testicular and epididymal effect from exposure to the test chemical.
References	Givaudan Roure (1990c). Re-evaluation of testicular and epididymal side effects caused by <i>p</i> -t-butyl <i>alpha</i> -methyl dihydrocinnamic aldehyde in rats following short (5 days) and subchronic (13 weeks) oral administration. Unpublished. Report to RIFM.
Substance Name	<i>p</i> -t-Butyl- <i>alpha</i> -methyl dihydrocinnamaldehyde

CAS No.	80-54-6
Method/guideline	13-weeks Subchronic study. Groups of 14 male and 14 female rats were treated by oral gavage with 0, 5, 25, and 50 mg/kg for five days per week for 13 consecutive weeks.
GLP	Likely
Year	1990
Species/Strain	Rat
Sex	Male
Route of administration	Oral (gavage)
Doses/concentration	0, 2, 5, 25 and 50 mg/kg/day
Exposure	13 weeks
Frequency of treatment	5 days per week for 13 weeks
Control Group and treatment	Yes
Post exposure observation period	4 weeks
Remarks	The rats were sacrificed with exception of 4 control rats per sex and a satellite group of 14 rats per sex treated with 50 mg/kg. These rats were necropsied after a treatment-free period of approximately 4 weeks.
NOAEL (NOEL)	5 mg/kg/day
LOAEL (LOEL)	25 mg/kg/day
Toxic response/effects by dose level	Necropsy findings comprised spermatoceles and the occurrence of small testes in male rats treated with 50 mg/kg. Treatment-related histopathology findings were spermatoceles and testicular atrophy in male rats treated with 50 mg/kg.
Remarks for Results	No treatment related deaths, Other treatment related observation included: Loss of hair in female rats, reversible decrease in cholinesterase activity and the plasma cholesterol levels in male and female rats, Absolute and relative weights were elevated in male and female rats treated with 25 and 50 mg/kg. The absolute and relative weights of adrenal glands were elevated in female rats treated with 25 and 50 mg/kg.
Conclusion Remarks	Administration of the test substance for 5 consecutive days resulted in disturbance of the spermatogenesis and spermiogenesis. The morphological alterations in the seminiferous epithelium preceded the formation of detectable spermatoceles.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	Two of the four control rats displayed a disturbance of spermiogenesis with desquamation of young spermatids. Also, authors states that rat seems to be much more prone to spermatoceles than e.g. the mouse, therefore the rat might be a bad model for detecting epididymal side effects of chemicals. Authors also claim that the rat was found to be only species to

References

suffer from adverse testicular and epididymal effect from exposure to the test chemical.
Givaudan Roure (1990c). Re-evaluation of testicular and epididymal side effects caused by *p*-*t*-butyl *alpha*-methylhydrocinnamic aldehyde in rats following short (5 days) and subchronic (13 weeks) oral administration. Unpublished. Report to RIFM.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Test substance was administered orally to white rats for 25 day.
GLP	NG
Year	1974
Species/Strain	White rat
Sex	Male
Route of administration	Oral (gavage)
Doses/concentration	0.02 LD50 (LD50 = 3400 mg/kg)
Exposure	25days
Control Group and treatment	Sunflower seed oil
Remarks	Following parameters were monitored: Plasma Cholinesterase activity, serum aldolases activity, sorbitol dehydrogenase, aspartate and alanine aminotransferase, content of SH groups, total protein level in the blood serum.
Toxic response/effects by dose level	No effects were reported.
Conclusion Remarks	No adverse effects were seen in the rats treated with cinnamaldehyde for 25 days at a dose of 0.02LD50.
Data Qualities Reliabilities	Reliability code 3. Data not reliable.
Remarks for Data Reliability	Original article in Russian. Very few details given.
References	Zaitsev, A.N. and Rakhmanina, N.L. (1974). Some Data on the Toxic Properties of Phenylethyl and Cinnamyl Alcohols. Vopr Pitaniya 6: 48-53.

Substance Name	<i>alpha</i> -Hexylcinnamaldehyde
CAS No.	101-86-0
Method/guideline	Test material was applied percutaneously to the shaved dorsa of 10 male Sprague-Dawley rats at dose levels of 0.15, 0.375, 0.75, 1.5 and 3.0 g/kg/day for 28 consecutive days,
GLP	Yes

Year	1980
Species/Strain	Sprague-Dawley rats
Sex	Male
Route of administration	Percutaneous
Doses/concentration	0.15, 0.375, 0.75, 1.5 and 3.0 g/kg/day
Exposure	28 days
Frequency of treatment	Daily
Control Group and treatment	None
Post exposure observation period	None
Remarks	Parameter monitored: body wt., food consumption, hematology, blood chemistry (BUN), serum glutamic pyruvic transaminase, serum glutamic oxalacetic transaminase, total bilirubin, fasting serum glucose, serum alkaline phosphatase), gross pathology, histopathology.
LOAEL (LOEL)	0.15 g/kg/kg
Toxic response/effects by dose level	Erythema and eschar formation with cracking and dryness @all doses, hyperirritability @ all doses except 0.375 g/kg/day, reduced body wt @ 1.5 & 3.0 g/kg/day, depressed food intake @ 3.0 g/kg/day, dose-related negative effect on clotting time & white blood cell count, shift in the proportion of segmented neutrophils to lymphocytes @ 1.5 & 3.0 g/kg, increase in BUN, SAP, SGPT, SGOT & decrease in Glucose, thickening of the skin & erythema of dermis & epidermis, body emaciation, congested lungs, GI irritation, decrease in absolute & relative thymus & spleen, dermatitis with mild to severe hyperkeratosis at all doses except 0.15 g/kg, focal dilation of tubules in kidney @ 0.75 & 1.5 g/kg, sub-acute to chronic necrotizing & hemorrhagic enteritis
Statistical evaluations	No statistical evaluation was done.
Remarks for Results	Because small number of animals (2 per group) no statistical evaluation was done.
Conclusion Remarks	Repeated percutaneous administration of <i>alpha</i> hexylcinnamic aldehyde resulted in changes in gross pathology, histopathology, clinical and biochemical chemistry and hematological parameters.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was conducted in accordance with GLP.
References	Lough, R., Owston, E., Bier, C., and Qureshi, S. (1980). A Range finding evaluation of the toxicity of Hexyl Cinnamic aldehyde Administered percutaneously in the rat. Unpublished. Bio-Research Laboratories Ltd. Report to RIFM.

Substance Name	<i>alpha</i> -Amylcinnamaldehyde
CAS No.	122-40-7
Method/guideline	15 Male & 15 Female rats of the FDRL strains were fed diet containing 2% test substance diluted in cotton-seed oil for 12 weeks. At 90 days, autopsy was performed. Hematological and blood chemical determinations were also made.
GLP	Pre GLP
Year	1965
Species/Strain	FDRL Strain Rats
Sex	Male and Female
Route of administration	Feed
Doses/concentration	2% in feed
Exposure	12 weeks
Frequency of treatment	Feed diet with test material for 12 weeks
Control Group and treatment	Feed without tests material
Post exposure observation period	NG
NOAEL (NOEL)	2%
Statistical evaluations	NG
Remarks for Results	No treatment related adverse effects were noted in the parameters measured.
Conclusion Remarks	This study demonstrates a NOAEL in rats was shown to be 2% in feed.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.
References	Oser, B.L., Carson, S, and Oser, M. (1965) Toxicological Tests on Flavouring Matters. <i>Fd. Cosmet. Toxicol.</i> 3: 563-569.

4.5 Reproductive Toxicity

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	NG
Test Type	Two generations

GLP	NG
Year	1965
Species/Strain	Not given
Sex	Female
Route of administration	Unreported
Duration of test	223 & 210 days
Doses/concentration	2 mg cinnamaldehyde every other day
Premating Exposure period for males	NA
Frequency of treatment	Continuous
Control Group and treatment	Not mentioned
Remarks for Test Conditions	Article in Romanian. English abstract contains very few details. Parameters monitored: body weight, reproduction ability (no. of pregnant females, no. & weight of the young one at birth), the development & viability of the young animals, the protein & lipid contents of liver & liver activity.
Remarks for Results	Treatment resulted in significant ($p < 0.01$) 20-22% increase in the lipid content of the liver as compared to control groups. The other indicators were not affected. No details were given whether the observed effect was in offspring or Parents. Article in Romanian.
Conclusion Remarks	Administration of the test substance caused an increase in liver lipid content in the unspecified group.
Data Qualities Reliabilities	Reliability code 3. Data not reliable.
Remarks for Data Reliability	Article in Romanian. The English abstract contains very few details.
General Remarks	Article is in Romanian. Need English translation of more details.
References	Sporn A. (1965). Investigation of the Toxicity of Cinnamic Aldehyde. Igiena 14(6): 339-346.

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	Cinnamic aldehyde was administered by gavage to Sprague-Dawley rats on days 7-17 of pregnancy at doses of 5, 25 or 250 mg/kg/day.
Test Type	Pre-Natal (Segment II) Toxicity Study.
GLP	NG
Year	1989
Species/Strain	Sprague-Dawley rats

Sex	Female
Route of administration	Gavage
Duration of test	Days 7-17 of pregnancy
Doses/concentration	0, 5, 25 or 250 mg/kg/day
Premating Exposure period for males	None
Premating Exposure period for females	None
Frequency of treatment	Daily
Control Group and treatment	Vehicle (olive oil)
NOAEL (NOEL)	None
LOAEL (LOEL)	5 mg/kg/day
Actual dose received by dose level and sex	0, 5, 25 or 250 mg/kg/day
Parental data and F1	No signs of maternal toxicity, decreased weight gain between day 7 & 20 with decrease in food intake.
Offspring toxicity F1 and F2	Increased incidence of poor cranial ossification, decreased ossification of tympanic bulla at 25 or 250 mg/kg/day, increased incidence of dilated pelvis/reduced papilla in kidney, increased incidence of reduced cranial ossification, dilated ureter. One case of facial malformation & few cases of hypoplastic/dysplastic kidney.
Statistical evaluations	Kruskal-Wallis test, Mann-Wittney test
Remarks for Results	Authors abstract state "significant increases of the incidences of dilated pelvis/reduced papilla in the kidney, dilated ureters>2 abnormal sternebrae per fetus were detected in the 2-mg/kg group." However no such dose group (2-mg/kg) is reported in either the methodology or the Results section.
Conclusion Remarks	Administration of Cinnamaldehyde to pregnant rats resulted in increased incidence of poor cranial ossification and reduced ossification of the tympanic bulla. Significant increases of the incidences of dilated pelvis/reduced papilla in the kidney, ureters > 2 abnormal sternebrae per fetus were also reported.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-review journal.
General Remarks	The changes in treated groups might have been influenced by the greater litter size in the higher dose groups (There was significantly higher pre-implantation loss in control as compared to the treated groups).
References	Mantovani, A., Stazi, A.V., Macri, C., Ricciardi, C., Piccioni, A. and Badellino, W. (1989). Pre-Natal (Segment II) Toxicity Study of Cinnamic Aldehyde in the Sprague-Dawley Rats. Food and Chemical Toxicology 27(12): 781-786.

Substance Name	Instead of Cinnamaldehyde, structurally related chemicals, Cinnamic alcohol and cinnamic acid were used in this study
CAS No.	104-55-2
Method/guideline	The chemicals were studied at doses of 0.02 and 0.002 LD50 value; 53.5 mg/kg cinnamic alcohol and 50 mg/kg cinnamic acid. The animals were exposed to the test chemical during the entire pregnancy.
Test Type	Reproductive toxicity.
GLP	NG
Year	1975
Species/Strain	Albino rat
Sex	Female
Route of administration	Oral
Duration of test	20 days
Doses/concentration	53.5 mg/kg cinnamic alcohol and 50 mg/kg cinnamic acid
Premating Exposure period for males	None
Premating Exposure period for females	None
Frequency of treatment	Daily
Control Group and treatment	Yes
Remarks for Test Conditions	There were 14-15 female rats in each group. On the 20th day of pregnancy 6-9 rats from each group were decapitated, the embryos were taken from the uterus and studied. The remaining pregnant rats were left until the natural birth and the development of the progeny was observed during the postnatal period for one month. The parameters monitored: embryonic mortality, number of live embryos, birth weight, length, number of external and internal anomalies in the development of the embryos.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Offspring toxicity F1 and F2	Cinnamic alcohol and cinnamic acid administration perorally to rats during the whole pregnancy is doses of 53.5 and 50 mg/kg caused no embryotoxic effect.
Conclusion Remarks	Cinnamic alcohol and cinnamic acid administration perorally to rats during the whole pregnancy is doses of 53.5 and 50 mg/kg caused no embryotoxic effect.
References	Zaitsev, A. N. and Maganova, N. B. (1975). Embryotoxic Action of Some Food Aromatizers. Voprosy Pitaniya 3: 64--68.

4.6 Developmental Toxicity

Substance Name	Cinnamaldehyde
CAS No.	104-55-2
Method/guideline	The study was conducted in two phases: initial dose-finding study followed by a reproductive phase, which employed a single dose level. In both phases treatment was administered by gavage using a standard dosing volume of 10 ml/kg.
Test Type	Developmental Toxicity Test
GLP	NG
Year	1987
Species/Strain	CD1 mice
Sex	Female
Route of administration	Oral (gavage)
Duration of test	From Gestation Day 6-13
Doses/concentration	1200 mg/kg/day
Premating Exposure period for males	None
Premating Exposure period for females	None
Frequency of treatment	Daily
Control Group and treatment	Corn oil
Remarks for Test Conditions	For Phase I, test chemical was tested at five dose levels using ten virgin female mice for 8 consecutive days. For the Reproductive phase, the LD10 predicted on the basis of dose-finding results was the single dose used. Treatment in the reproductive phase were administered once daily on Gestation day 6-13
NOAEL (NOEL)	1200 mg/kg/day
Parental data and F1	As compared to controls, no changes were seen in: Number of dead/total; % body weight change and delivery of viable litter.
Offspring toxicity F1 and F2	As compared to control, no changes were seen in: Number of stillborn/litter; %survival; birth weight and weight gain.
Statistical evaluations	2-tail ANOVA, 2-tail Fischer's exact test,
Conclusion Remarks	Administration of Cinnamaldehyde to pregnant female mice (gestation day 6-13) did not produce any maternal, fetal or neonatal toxicity.
Data Qualities Reliabilities	Reliability code 2. Reliable with restrictions.
Remarks for Data Reliability	The study was published in a peer-reviewed journal.

References

Hardin, B.D.m Schufer, R.L., Burg, J. R., Booth, G.M., Hazelden, K.P., MacKenzie, K.M., Piccirillo, V. J. and Smith, K.N. (1987). Evaluation of 60 Chemicals in a Preliminary Developmental Toxicity Test. Teratogenesis, Carcinogenesis and Mutagenesis 7: 29-48.